DESIGN AND IMPLEMENTATION OF A COURSE OF INSTRUCTION IN CLINICAL MICROCOMPUTER APPLICATIONS FOR SPEECH-LANGUAGE PATHOLOGISTS AND AUDIOLOGISTS

BY

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Major Department: Speech

The purpose of this study was to develop, implement and validate a course of instruction in Clinical Microcomputer Applications for Speech-Language Pathologists and Audiologists. A curriculum was designed and taught as a one semester graduate level course.

Twelve students registered for the course. None had previous course work in computer programming or computer applications. At the end of the course, the students rated units of curriculum on several parameters including rationale for inclusion of the course, breadth of the material, and perceived usefulness in a clinical situation. This questionnaire was also administered to students in two graduate core clinical courses. Students' ratings of the experimental course were comparable to ratings of students registered in the core courses.

A mail survey was sent to chairpersons of 88 universities with graduate programs in speech-language pathology and audiology. The purpose of the survey was to obtain other professionals' assessment of the course content and to determine the use of microcomputers in their clinical programs. Fifty-five (63%) respondents returned the mail survey. Seventy percent of the respondents felt that no additional major area(s) should be appended to the course curriculum. Thirty percent felt that various other major areas should be added. Specifically, the respondents indicated that the areas of clinical audiological assessments and learning a computer programming language were both areas that should be included in the course content. Ninety-three percent of the respondents felt that none of the areas in the current curriculum should be deleted.

It appears that the students registered for the Clinical Microcomputer Applications course and the respondents from universities with graduate programs in speech-language pathology and audiology felt the course to be valid and adequately comprehensive for inclusion in a curriculum for speech-language pathologists and audiologists.

CHAPTER I
BACKGROUND AND PURPOSE

Introduction

The microcomputer is a device which has the capability of serving multiple purposes in the professional field of speech-language pathology and audiology. Speech-language pathologists and audiologists provide assessment, diagnosis and treatment for the estimated 22 million communicatively impaired individuals in the United States (Wilber, 1982). The microcomputer has significant potential to serve diagnostic, therapeutic and administrative functions in areas of clinical rehabilitation.

Clinically, the microcomputer can administer, score and analyze diagnostic tests and perform and score certain types of therapy programs, thereby saving the clinician time to work with more complex cases. Administratively, the microcomputer can save the clinician time in composing and correcting written material, and maintaining client schedules, records, and therapy data. Its data keeping capabilities allow for ongoing collection of treatment data in addition to collection of data pertinent to planning for projected service needs. The microcomputer has the potential to facilitate professional efficiency while at the same time providing for better

services in the habilitation and rehabilitation of communicatively impaired populations. Due to the ever growing availability of microcomputers within elementary schools and clinical rehabilitative services, the microcomputer is no longer an obscure device which has limited clinical utility and accessibility for speech-language pathologists.

Educators have had many opportunities to demonstrate the utility of microcomputers in their profession, while speech-language and hearing clinicians have had limited experience with microcomputers due to both the lack of computer training and limited access to microcomputer systems in academic training programs. To date, there are few efficient and effective curricular vehicles for teaching graduate speech-language-hearing student clinicians basic daily applications of the microcomputer. Academic courses which focus on microcomputer applications in the profession of speech-language pathology and audiology would be an appropriate vehicle for teaching the capabilities, limitations, applications and implications of microcomputer systems. Specifically, the purpose of this investigation was to develop and implement an academic and laboratory course for instruction in the daily application of microcomputers for speech-language and hearing clinicians.

Review of the Literature

The multifaceted use of microcomputers has been discussed in some detail in the educational literature (Allen and McCullough, 1980; Dickerson and Pritchard, 1981; Gleason, 1981; Watts, 1981). Although still in the early stages of development and use in speech-language pathology and audiology, there have been efforts made to use microcomputers for administrative and clinical applications. The review of the literature is related to the rationale and use of computers and microcomputers in education and clinical rehabilitation. The literature will be discussed in three areas, 1) the history of computer usage in speech-language pathology and audiology, 2) the history of microcomputers in education, and 3) the history of computer literacy courses.

Computers in Speech Pathology and Audiology

Computers have been utilized for many years in certain speech and hearing facilities for research activities and for client record maintenance and analysis. However limited data are available on the use of computers in the areas of assessment and habilitation. The following section will discuss the use of computers and microcomputers in client record keeping (Elliott, Vegely and Falvey, 1971; Harden, Harden and Norris, 1977; Peterson, 1977; Rushakoff, Vinson, Penner and Messal, 1979; Rushakoff and Toossi, 1982; Gerhardt

and Handel, 1982), assessment (Fields and Renshaw, 1978; Somers, 1979; Telage, 1980; Wilson and Fox, 1981B; Lombardino and Wong, 1982), and habilitation (Fitch and Terrio, 1975; Nickerson, Kalikow and Stevens, 1976; Hight, 1981; Macurik, 1981; Mills and Thomas, 1981; Rushakoff and Williams, 1982; Wilson and Fox, in press).

Record keeping

Elliott, Vegely, and Falvey (1971), at the Central Institute for the Deaf (CID), developed one of the first programs for computerizing clinical data. The program was designed to serve clinic and research needs based on information from client files. The authors designed computer programs which provided for the updating of client records. Client information, test scores, and audiograms of children enrolled at CID were stored on the computer. This program was used to obtain descriptive analyses of their client populations. In addition, their program had the potential to evaluate the effectiveness of certain clinical procedures.

Mahaffey (1973) described a computerized procedure for maintaining student clinic clock hours and coursework as required for American Speech-Language and Hearing Association-Certificate of Clinical Competence (ASHA-CCC) requirements. At the beginning of each semester, all students would enter in their latest completed courses and practicum hours. The computer sorted this information and provided a

listing of as yet unfulfilled academic and clinical requirements. This system was designed to save advisors' time and to help reduce errors in student scheduling. The computer program was used to provide the department with information regarding future course offering needs and approximate class enrollment.

Harlan and Hasegawa (1976) provided a more extensive description of a computerized system for maintaining clinic clock hours. Their system assisted the clinic staff in scheduling graduate students in the department with the variety of disorders needed to fulfill ASHA-CCC clinical requirements. Since the expected date of graduation was included in the computerized file, the clinic staff could prioritize which students would be assigned to a particular type of case.

In all the previous studies, data were collected on forms and then keypunched for entry into a computer system. Peterson (1977) described an improvement in this data entry process in which the information was filled out by clinic supervisors on custom-designed optic-scan forms that could be entered into the computer without keypunching. The major disadvantage of this system was the prohibitive cost of designing a custom form; however, Peterson argued that the cost of the form design was offset by the potential savings on keypunching.

Rushakoff, Vinson, Penner and Messal (1979) described a computerized record-keeping program for a speech and hearing

department in a residential facility for the mentally retarded. They collected fifty pieces of information on the 1,100 residents at the facility. The purpose of the project was to provide computerized summary reports on all residents and to plan for projected service needs. For example, from the information compiled from this computerized system, it was determined that 67% of the residents did not or could not communicate through the speech mode. This information was used to determine specific equipment and material needs, necessary areas of specialization for prospective employees, and in-service training needs for speech and hearing clinicians and other staff at the facility. The computerized data also indicated where clinical time could be saved. For example, 98 out of 100 residents who passed an initial hearing screening also later passed a complete audiological evaluation. These data were useful in prioritizing future scheduling for audiologic evaluations.

This project highlighted two major difficulties in maintaining computerized client files. First, it was difficult for the clinicians to agree upon information needed, and how the information could be recorded in a systematic form. Second, since it was necessary to use a computer programmer each time the data were queried and since several days were required to obtain a printout of even one question, the use of the computerized data system was somewhat unattractive to the clinicians on staff.

Rushakoff and Toossi (1982) developed a program for maintaining individual client therapy data on a microcomputer system. The program was designed for use by speech-language and hearing clinicians with no previous microcomputer experience. The program continually prompts the user through every stage of data entry and retrieval. First, the program asks for basic identification and demographic information and then prompts the clinician to enter from 1 to 10 therapy goals, to each of which up to 16 updates can be added. All information can be changed and updated at any time and allows the clinician to sort the files alphabetically by client name. All files, sorted or unsorted, can be viewed on the monitor or printed out. This program is able to accept modifications; for example, it is possible to add a statistics section that would allow the clinician to perform statistical analyses of the therapy data.

Gerhardt and Handel (1982) developed an interactive microcomputer program designed to store data from pure tone audiograms obtained from employees working in noise hazardous environments. These data can be recalled and analyzed according to one of two methods used to define significant threshold shift. The program is capable of compensating for the effects of age on hearing sensitivity. It was designed primarily for industrial audiology and uses the most recent Occupational Safety and Health Administration (OSHA) standards.

Maintaining client assessment and habilitation data on the microcomputer is a major area of computer applications for speech-language pathologists and audiologists who serve communicatively handicapped populations. This application is becoming increasingly more prevalent as clinicians learn to utilize data base microcomputer programs.

Diagnostic and therapeutic applications

Prior to the proliferation of microcomputers, some speech pathology and audiology researchers have used large 'main frame' computers for assessment and therapy procedures. Fields and Renshaw (1978) used a computer to analyze the language samples of children to determine if the computer could discriminate between language disordered children and language normal children. While the computer was able to discriminate between language disordered and language normal children, the investigators found that the computerized procedure was no more time efficient than the traditional manual analysis. They concluded, however, that some of the time involved in the computer process could be delegated to non-professionals, thereby freeing the clinician for other clinical activities.

Lombardino and Wong (1982) developed an interactive microcomputer program designed to perform language sample analyses by coding, for example, syntactic, pragmatic, and semantic parameters of utterances. The program has an open coding system that allows for up to 120 distinct codes. The

program displays each utterance one at a time and requests the clinician to enter the code or codes for that utterance. When all utterances have been coded the program offers three choices of analyses which can be viewed on the monitor and printed. The analyses consist of frequency and percent matrices for all the codes used.

Nickerson, Kalikow and Stevens (1976) used a computer to help teach articulatory proficiency to 40 deaf and hearing impaired children at a school for the hearing impaired. They developed several computer programs which provided visual feedback for various phonological components. The computer was equipped with a speech recognition unit which analyzed students' verbal responses. The computer monitor provided visual feedback on the children's phonological productions. For example, the Cartoon Face program used an anterior sketch of a head and neck to provide feedback to the student. Voicing was indicated by appearance of an Adam's apple and loudness level was indicated by the size of mouth. The students were able to use the system with teacher assistance or independently. The students did show change in certain phonological skills; however, posttest assessment indicated that overall intelligibility of the test group did not significantly improve.

In a similar single-subject project, Fitch and Terrio (1975) used a computer to perform articulation therapy with a six-year-old girl who presented a "functional" /s/ deviation.

The stimulus cards were presented to the child by the clinician and the computer was programmed to analyze the child's speech responses and to provide feedback on response accuracy. Specifically, the computer indicated whether the child should move to the next step, return to an easier level, or remain at the same level. The student completed the program in six sessions, a total time of two hours. The investigators considered the experiment complete when the subject produced the phoneme correctly and consistently in spontaneous speech. They concluded that the time factor compared favorably with traditional clinical procedures.

Somers (1979) and Telage (1980) have described computer programs to analyze the results of articulation assessment. Somers developed the Computerised Articulation Test to analyze articulation performance data obtained from The Edinburgh Articulation Test (Anthony, Bogle, Ingram, and McIsaac, 1971). Somers states that one of the serious limitations of his program is that it was limited to analyzing data from one articulation test; however, he indicates that future developments of the program will allow analyses of data from other articulation tests. Once the data is entered into the computer, the program provides seven tables of analyses, e.g, an item-by-item comparison of test and target data and statistical feature analyses.

Telage (1980) designed a computer program to perform a series of segmental and componential articulation analyses.

The objective of the program was to specify the patient's articulatory behaviors that contributed most significantly to the pattern of misarticulation. This program can be utilized after consonant misarticulations are identified and evaluated using the Deep Testing procedure (McDonald, 1964). The contextual sound error data from the Deep Test were entered into the computer using a keyboard and video screen. The program analyses could then be viewed on the video terminal screen before they were printed out. These data could then be utilized by the clinician in designing the most appropriate treatment program. Telage argues that computer analyses of misarticulations can significantly simplify the process of determining an individual's underlying patterns of misarticulation because the computer can easily scan and analyze a large representative sample of articulatory patterns in short period of time.

The inclusion of the microcomputer in some speech and hearing clinics spawned a new series of developments of diagnostic and therapeutic programs. Mills and Thomas (1981) developed a series of microcomputer programs to augment clinicians' language programs for aphasics. The stimuli presented in these programs are printed on the monitor and spoken by the microcomputer through a speech digitizer. The patient must then choose from one of four high resolution color pictures on the monitor by entering the number of that picture. The program provides verbal and visual feedback on

the client's response. When the program is completed it provides a data summary of the client's progress. Mills and Thomas reason that microcomputer augmented clinical services are important for this population as these patients require more therapy than clinicians may have the time to provide.

Rushakoff and Williams (1982) recently developed a microcomputer program that allows clients who exhibit /s/ phoneme deviations to use the microcomputer equipped with a speech recognition unit for practicing the production of the /s/ phoneme. This program provides visual and auditory feedback on the proficiency of the client's production of the /s/ phoneme in isolation or in the initial position of a word. At the end of the training session the program indicates 1) how many attempts were made, 2) how many were correct, 3) how many were incorrect and 4) how many were incorrect, but close. This program does not teach the client the manner in which to produce the /s/ phoneme, but provides feedback and reinforces correct productions.

Other microcomputer programs have been developed to provide communication habilitation for the deaf and hearing impaired. Macurik (1981) developed a microcomputer program that uses a speech recognition unit. The model of the sound is entered into the microcomputer by the clinician or a tape recording and a visual display of the sound appears on a section of the monitor. The client is required to match the pattern of the model by speaking into the speech recognition unit and compare the visual display produced with the model.

Hight (1981) developed a microcomputer program designed to assist in training the deaf and hearing impaired in speech-reading. The clinician or client types a word or sentence into the microcomputer and the entry is then displayed on the monitor in a series of animated lip movements or the client must determine which sentence was produced by the lip animation from four printed sentences that appear on the monitor. Data from the training sequence are stored on a diskette so that the clinician can determine the client's progress.

Several microcomputer programs have been developed to augment instruction in fingerspelling for hearing impaired individuals (Kihneman and Salathiel, 1981; Welsh, Mancuso and Licata, 1981; Johnston, 1981; Boyer, 1981). For example, Kihneman and Salathiels' microcomputer program (1981) is designed to teach fingerspelling by utilizing the graphics capability of the microcomputer. The speed which with the microcomputer produces the fingerspelling can be controlled so that certain commonly occurring groups of letters can be recognized more quickly.

Recently, Wilson and Fox (1981A; 1981B) have been using the microcomputer to assess various aspects of language comprehension in children. They found no performance differences between microcomputer assessment of selected prepositions and live assessment using color printouts of the

microcomputer test plates. They initially designed the program to assess comprehension of three prepositions, "on", "in", and "under." Pictures were presented on the monitor and verbal stimuli were presented by the microcomputer through digitized speech. They used 10 of the 15 assessment plates to teach two young, developmentally delayed Franco-American children prepositions. The subjects were taught the prepositions they failed in the initial microcomputer assessment. The microcomputer remediation program was successful for both children (Wilson and Fox, 1980).

Wilson and Fox (in press) have recently reported the preliminary results of microcomputer language therapy material for language delayed children. One subject whom they tested with this material was a three-year-two-month-old language-delayed girl. After baseline assessment of three prepositions (in, on, under) she was administered a training sequence through the microcomputer and positive training results were recorded.

The microcomputer has been demonstrated to be an effective clinical tool for evaluation and treatment purposes. A primary reason for the initial minimal application of computers in speech and hearing activities has been the price and size of the equipment. The recent development and proliferation of economical and small microcomputer systems has enhanced the feasibility of using microcomputers in

rehabilitative professions. Although cost may have been the initial reason for the limited application of computers by speech and hearing clinicians, the current problem is the lack of clinical training available for clinicians in its multiple applications.

Microcomputers in Education

The development of computers as instructional devices in the schools has a long history (Suppes, Jerman, and Brian, 1968; Lyman, 1972; Schoen and Hunt, 1977). According to Burns and Bozeman (1981), the endeavors of computer-assisted-instruction (CAI) "offered the promise of greater student achievement, more efficient use of human and material resources, improved attitudes toward the learning process, and an enhancement of education in general" (p. 32). Burns and Bozeman (1981) agree that although there have been many excellent studies related to CAI over the past 20 years there has been little written to synthesize and interpret the various independent efforts.

Initially CAI was utilized by members of the computer industry in the late 1950's for personnel training (Suppes and Macken, 1978). Schoen and Hunt (1977) stated that educational CAI was a natural combination of emerging computer technology and the programmed instruction movement. Federal funding for educational programs which were available in the early 1960's provided the additional stimulus needed for further development in educational CAI (Atkinson and Wilson, 1969).

Throughout the 1960's several computer corporations entered into the field of computer-assisted-instruction. Many studies and projects were undertaken by computer corporations in conjunction with major university educational research and development specialists (Burns and Bozeman, 1981).

One of the first major CAI endeavors in public school education was the Stanford Computer-Assisted-Instruction Project. The project, which began in 1963, was designed to develop a small tutorial system which would provide instruction in elementary mathematics and language arts. The second part of the Stanford Project was the development and implementation of CAI programs in reading and mathematics for culturally disadvantaged students. When the second year of the project ended, approximately 400 students had received daily computer controlled-instruction in reading or mathematics (Suppes, Jerman, and Brian, 1968).

While the Stanford Project was being developed and tested other major projects were being conducted. A second CAI system, The Stanford Drill-and-Practice System, was also being developed. During the 1967-68 school year, approximately 3,000 students received daily CAI lessons in initial reading, arithmetic, and spelling (Suppes and Morningstar, 1972).

The Individual Communication (INDICOM) system, initially tested in 1967 in the Waterford, Michigan, School District, was the first public school CAI project in the Midwest. The

INDICOM System included teacher-authored CAI curriculum packages in 11 content areas within the broader curricular domains of mathematics and language arts for grades kindergarten through twelfth. A systems approach to curriculum creation accommodated specification of behavioral objectives, instructional sequencing, and procedures for evaluating model effectiveness (Burns and Bozeman, 1981).

The PLATO system (Programmed Logic for Automatic Teaching Operations) was first established in 1960 in the Coordinated Science Laboratory at the University of Illinois (Lyman, 1972). During a seven-year period the feasibility of effectively utilizing this computer-based teaching system toward the goal of automating individual instruction was explored. During this period, approximately 300 programs were written for the system to demonstrate its flexibility for teaching as well as for educational research.

Definitive data relative to the pedagogical effectiveness of CAI as an instructional medium have remained elusive (Avner, Moore, and Smith, 1980). Additional years of research have failed to alleviate the dilemma. Published studies comparing the effectiveness of CAI to traditional instruction report conflicting and inconclusive results. The studies, however, generally conclude that an instructional program supplemented with CAI is at least as effective as, and frequently more effective than, a program utilizing only traditional instructional methods (Magidson, 1978).

Edwards et al. (1975) reviewed the research comparing CAI with traditional methods and found that 1) normal instruction supplemented by CAI is more effective than normal instruction alone, 2) CAI is equally effective relative to student achievement when compared with other nontraditional instructional methods, 3) it was more time efficient for students to learn through CAI than through other methods, and 4) that there is some evidence that learning retention levels of CAI students may not be as high as those of students taught through traditional methods.

As previously noted, hardware costs for microcomputer systems have declined so significantly that cost is no longer a prohibitive factor in the purchasing of microcomputers for classroom use (Lopez, 1981). According to Braun (1980) elementary and secondary school purchases of microcomputers will exceed 100,000 units by 1982. The National Science Foundation estimated that there are currently 200,000 microcomputers in elementary and secondary schools and projects that this number will reach one million by 1985 (Gleason, 1981).

A survey on the use of microcomputer instruction by Chambers and Bork (1980) indicated a projected increase from 54% to 74% in their nationwide sample of public schools. According to Molnar (1981), an estimated 350 million dollars were spent in pre-college computer use in 1975 and that the

current estimate of computer usage in elementary and secondary school instruction nationwide is about 50% with expenditures approaching 700 million dollars.

The large scale increase of microcomputers in the public schools has generated a need for descriptions of the educational applications of microcomputers. Watts (1981) delineated 12 fundamental uses of computers in education which he collapsed into the three major categories: school organization, curriculum development, and instruction. Although he states that the most extensive use of the microcomputer lies in school administrative applications, he notes that many schools are using the systems to teach programming to students. The key to the expansion of microcomputer applications according to Watts is educating teachers in the various applications of the system.

Similarly, Tyler (1980) provided a rationale for the attractiveness of technology and microcomputers in classroom settings. He suggested that teachers will find technology appealing if it (a) performs educational tasks that are distasteful or boring; and (b) allows them to solve learning problems or perform other educational tasks more effectively or easily.

An example of an educational microcomputer program which meets Tyler's specifications was developed by Hasselbring and Crossland (1981). They indicated that some teachers may not

have the time or the skills necessary to assess the specific types of spelling problems in learning handicapped children. They developed a microcomputer spelling assessment program for handicapped learners. They found the Computer Diagnostic Spelling Test (CDST) to be an efficient and cost-effective way to diagnose and remediate spelling problems. The CDST does not require a teacher for administration or scoring. In most cases, the student can complete the test independently or with the help of an aide. The authors suggest that an added benefit is that some children who may feel pressured by time constraints with teacher administered tests may feel more relaxed and perform at a higher level of functioning with a computerized assessment.

The CDST has four components: 1) student information, 2) directions for the student, 3) presentation of the spelling words, and 4) the scoring and diagnostic summary of the results. The stimulus words are presented verbally by a microcomputer-controlled cassette recorder. The monitor asks the student to "Type the word," waits for the word to be entered and internally scores the response. The investigators do not report any specific results of test trials. An advantage of using a program such as this is that it frees the teacher to work in those particular educational areas which require direct teacher instruction.

In summary, there is a growing consensus that microcomputers will have a significant impact on the future of education (Dickerson and Pritchard, 1981). Allen and McCullough (1980) state that

> this changing role of technology in education and in the society at large clearly presents both an opportunity and a challenge. The opportunity to exploit in increasingly ingenious ways the uses of technology for fostering the educational process presents with it the challenge to use that technology in a way that makes it possible for the next generation of students to live in a world technologically and humanistically under control. (p.47)

While many microcomputer projects have been successful in schools, Dickerson and Pritchard (1981) argue that educational institutions have not been actively planning a programmatic approach for the use of microcomputers. They describe the current effort as a random, "hit or miss" approach.

Computer Literacy

According to Lopez (1981), computer literacy implies knowledge of the capabilities, limitations, applications, and implications of computers. With growing use of microcomputers in education, MacKinnon (1980), states that "computer literacy holds, in my estimation, the unheralded potential for the microcomputer" (p. 34).

Recently, Molnar (1978-1979) argued that the lack of computer literacy programs in colleges for teachers is wasteful. Dickerson and Pritchard (1981) note that many schools allow their students to enroll in technical computer courses, but few provide courses of instruction in daily applications in the field of education. Allen and McCullough (1980) argue that to have a successful computer literacy program, the participants should be provided with hands-on experience. Goldberg (1980) stated that part of the problem in computer literacy courses is that educational technologists now communicate with several different audiences and may not always use the minimum of technical jargon and "educationese."

Jay (1981) discusses the widespread phenomenon of computerphobia. He states that many individuals, including teachers and school administrators, are afraid of computers and that the causes of this phobia are diverse and vary from individual to individual. Some of these individuals will admit their fears, but others may not. He describes some specific symptoms of this phobia which generally surface as negative attitudes toward computers. Some may actually fear to touch the computer or may fear that by touching it they may break, damage, or destroy it. Potential users may feel so threatened that they try to rationalize that the capabilties of the computer are overrated and therefore try not to read or study anything related to a computer topic. They may actually

feel aggressive toward the computer. Jay states that these aggressive feelings may be due to insecurity; perhaps, in part, because of a fear that the computer may replace them!

Jay suggests that the establishment of literacy programs for their employees may reduce or eliminate computerphobia. Part of the problem in ameliorating computerphobia is that the individual may initially feel threatened or hostile toward individuals who have a basic understanding of computer utilization. Young (1979) suggests that the first objective in a computer literacy course for instructional technologists should be "Removal of the mystery and terror from the process of computer access" (p. 181).

Problem and Perspective

The microcomputer is both economical and user-oriented. It represents a new generation of computer technology that can be utilized easily by individuals with minimal computer training. This technology is now available to speech and hearing clinicians in public schools, clinics and hospitals. There are many applications for which speech and hearing clinicians may utilize the microcomputer, for example, maintaining client records and therapy data, and assisting the clinician in scheduling, assessment and therapy.

While applications abound, to date there exist few vehicles for training graduate students in speech-language and

hearing in the capabilities, limitations, applications, and implications of the microcomputer. The need for computer literacy programs for professionals is critical (Molnar, 1978-1979; Allen and McCullough, 1980; Dickerson and Pritchard, 1981; Jay, 1981). Computer literacy in the field of speech-language pathology and audiology will not prevail until comprehensive educational curricula are developed and incorporated into training programs for the purpose of instructing clinicians in the clinical and administrative applications of the microcomputer.

A computer literacy course for speech-language and hearing clinicians would require a broad based focus on microcomputer applications in order to demonstrate that the microcomputer is a device which can serve multiple functions in the field of communicative disorders. An introductory course in microcomputer applications should provide a fundamental level of familiarity with the microcomputer to lessen any fears or tension that might be associated with its use, provide the student with a comprehensive rationale for microcomputer use in clinical settings, and provide hands-on experience with the microcomputer.

The major purpose of this project was twofold: first, to design and validate an introductory course in microcomputer applications for speech-language pathologists and audiologists that demonstrates many of the applications discussed; and

second, to help desensitize students' fears or apprehensions associated with hands-on microcomputer experience. This course was designed to be user-oriented, not technically oriented. Its focus is pragmatic in nature in that it provides instruction for graduate level speech and hearing students in the specific applications and capabilities of microcomputers in the field of speech-language pathology and audiology.

The following questions were proposed for study:

1) Is the content as described in the proposed Clinical Microcomputer Applications course for Speech-Language and Hearing Clinicians, both valid and comprehensive as determined by a mail survey to university chairpersons who are members of the National Council of Graduate Programs in Speech and Language Pathology and Audiology;

2) Do the graduate students enrolled in the Clinical Microcomputer Applications course meet the objectives of the course at a 75% criterion level as measured by a pre/post course assessment;

3) Does the proposed Clinical Microcomputer Applications course compare favorably relative to students' perceptions of its appropriateness and usefulness when compared with two other elective, graduate level, clinical courses as measured by responses to a questionnaire given at the termination of the courses.

4) How are each of the 11 units in the proposed course rated in terms of significance of rationale provided for the unit, the amount of emphasis given to the unit, and the adequacy of laboratories as measured by a course evaluation given to the students at the termination of the course;

5) How do each of the 11 units taught compare with each other relative to: A) rationale presented for each unit, B) emphasis given to each unit, and C) adequacy of the lecture and laboratory material for each unit.

CHAPTER II
METHODOLOGY

The present investigation was designed to develop and evaluate a course of instruction and to determine its validity for potential inclusion within a speech and hearing academic and clinical training program. The course was developed and taught as a graduate level course to 12 students. The students were given a pre-test to confirm that they did not already possess the information that would be presented in the course. The identical test was given at the conclusion of the course to confirm that the students had learned the information presented in the course. Also, at the conclusion of the course the students completed anonymous questionnaires requesting information relative to the need of this course in an academic curricula. Students in two other graduate level courses completed the same questionnaire. The validity of inclusion of this material was also investigated through a mail survey addressed to the department chairpersons of 88 universities with graduate programs in speech-language pathology and audiology.

Subjects

A maximum of twenty graduate students majoring in speech pathology or audiology at the University of Florida were allowed to register for a two (2) credit semester course in Clinical Microcomputer Applications. Students majoring in other related areas (e.g. special education) were permitted to register for the course if space was available. No background in computers, electronics, or statistics was required or recommended as a prerequisite.

Students were advised of the availability of the course through notices which were sent to all speech-language pathology and audiology graduate students and through their academic advisement. The number of students for this course was limited due to the availability of the microcomputer that was used in the laboratory sections.

A total of twelve students registered for the course (see Table 1). Ten were speech pathology graduate students and two were special education graduate students. One of the ten speech pathology students was in the Ph.D. program. Two of the speech and hearing students were working full-time, one in a school with a physically impaired student program. One of the special education students was working full-time as a educator in a school program for physically impaired middle school students. None of the twelve students had ever registered in a college course related to computers. All of the registered students were female.

Table 1

Educational and Employment
Data for Subjects

Subject	Major	Current Degree	Working
1	Sp.Ed.	G	Yes
2	Sp.Ed.	U	No
3	Sp.Path.	G	Yes
4	Sp.Path.	G	Yes
5	Sp.Path.	U	No
6	Sp.Path.	U	No
7	Sp.Path.	U	No
8	Sp.path.	U	No
9	Sp.Path.	U	No
10	Sp.Path.	U	No
11	Sp.Path.	U	No
12	Sp.Path.	U	No

Key:

Sp.Ed. -Special Education
Sp.Path. -Speech Pathology

U - Undergraduate Degree
G - Graduate Degree

Procedures

Course Description

A course entitled Clinical Microcomputer Applications for Speech-Language and Hearing Clinicians was offered as a two semester credit Special Topics class (SPC 5905) during Spring Quarter, 1982 at the University of Florida. The class was conducted as a 60-90 minute lecture once a week and a 30-60 minute laboratory, which the students completed independently once each week. At the end of each lecture the students were given a laboratory packet based on the lecture topic (Appendix I). Each laboratory assignment covered one or more microcomputer programs (Appendix F). The laboratories were completed in teams of two. The content was composed of 14 lectures and 13 laboratories.

The eleven major units that were taught are as follows:

I. Overview of microcomputer applications in the speech and hearing clinic

II. Introduction to the microcomputer equipment

III. Maintaining client records

IV. Maintaining client schedules

V. Maintaining therapy data

VI. Introduction to microcomputer programming

VII. Word processing

VIII. Assessment

IX. Therapy

X. Non-vocal communication uses

XI. Data analysis and statistical methods

Course Requirements

The students registered for the course were required to 1) take a course pre-test and post-test, 2) attend all class lectures, 3) complete all assigned laboratories, and 4) complete a course evaluation form. The course evaluation was administered on the last day of class and the post-test was administered during the regularly scheduled final examination period. In order to monitor each student's progress in the course, each laboratory assignment was worth a total of 10 points. For university grading purposes the post-test served as the final examination.

Course Objectives

1) The students will be able to state five applications of the microcomputer in the speech and hearing clinic.
2) The students will be able to name and briefly describe the purpose of the four major components of the microcomputer system.
3) The students will be able to list and describe three reasons why the microcomputer should aid the clinician in maintaining client records.

4) The students will be able to list and describe two reasons why the microcomputer may assist the clinician in maintaining client schedules.

5) The students will be able to list and describe three reasons why the microcomputer may assist the clinician in maintaining therapy data.

6) The students will be able to describe the purpose of five BASIC programming statements. The students will be able to indicate why minimal programming expertise may assist the clinician in utilizing the microcomputer.

7) The students will be able to list five specific functions of word processing programs (i.e. replace a word, move a line, etc.). The students will be able to describe how the microcomputer may assist the clinician in report writing.

8) The students will be able to list three advantages of microcomputer language assessments.

9) The students will be able to list three reasons why the microcomputer may assist the clinician and the client in performing certain types of therapy.

10) The students will be able to list and describe six ways in which the microcomputer can assist the non-vocal, severely physically impaired client.

11) The students will be able to list three reasons why statistical and data analysis programs can assist clinicians in providing better services.

Course Content

The lectures consisted of 11 content units. The units are summarized below with a rationale, objective, and laboratory description for each. Since some content areas were determined by the investigator to be more clinically pertinent than others the amount of time devoted to the units varied. Nine of the units were covered in one lecture. Two of the units, Word Processing and Therapy, required more than one class period.

Unit 1

Overview of Microcomputer Applications in the Speech and Hearing Clinic

This section provided the rationale and goals for the course. The students were told that each unit of the course was designed to introduce the area rather than to teach it as a terminal skill. The major applications that were taught are as follows:

1) Maintaining client records
2) Maintaining client schedules
3) Maintaining therapy data
4) Word processing
5) Assessments
6) Therapy
7) Aid for non-vocal individual
8) Data analysis and statistical methods

Objective:

The students were required to list five applications of the microcomputer in the speech and hearing clinic.

Laboratory:

The purpose of the first laboratory was to reduce any anxiety or apprehensions the students might have toward the microcomputer equipment. The program utilized for this purpose was Lemonade Stand, an entertainment/business modeling program. The program is entertaining to use and at the same time allows the student to participate in several business/economics principles, such as how well a market may support the cost of a product. The program also demonstrated many of the capabilities of the microcomputer such as its interactive capability, color graphics, music, and sound effects.

Unit 2

Introduction to the Microcomputer Equipment.

This section of the course covered the main hardware components of the microcomputer system. The focus was on the function of each component (e.g. disk drive serves to store programs) rather than on the electronic processes that underlie the function. The specific components that were taught are: 1) computer (CPU, keyboard); 2) disk drive (floppy disks); 3) monitor; and 4) printer.

Objective:

The students were required to name and describe briefly the function of each of the four major microcomputer system components.

Laboratory:

This second laboratory continued the objective of the first which was to allow the students to explore the range of capabilities of both the microcomputer and the programs. The first program in this laboratory was the demonstration program on the ApplePilot diskette which demonstrates the manner in which individuals, without extensive programming experience, may create computer-assisted-instruction programs that utilize interactive capabilities, color graphics, and sound effects. The second section of the laboratory allowed the students to explore the use of the speech synthesizer. Guess The Number is a program in which the students were required to read the instructions from the monitor. A modified version of that same program was also utilized in this laboratory. In addition to written instructions printed on the monitor the modified version also provided spoken instructions through the use of synthesized speech.

Unit 3

Maintaining Client Records

This section of the course focused on the benefits of maintaining client records on the microcomputer. The students

were taught that maintaining client records on the microcomputer will serve three major purposes. First, it allows for a complete statistical analysis of the client files data base. It was explained to the students that this may have a significant effect in the speech clinics planning for future needs. For example, a frequency distribution of the types of disorders may help in purchasing assessment and therapy materials. In addition, information from client records may assist in determining particular skills that should be required of new personnel. Second, it may also be helpful in developing data necessary for grant funds and third, it reduces paper storage significantly. One microcomputer storage disk can hold 200-500 client files.

Objective:

The students were required to describe three reasons why the microcomputer will assist the clinician in developing an efficient file system for maintaining client records.

Laboratory:

In this laboratory the students worked with File Cabinet, a data base program. A data base had been previously established to maintain certain information regarding clients who had been evaluated at the University Speech and Hearing Clinic. Twelve fields (pieces of information) were entered for 10 clients. For this laboratory the students were required to review all 10 records, search for clients who had a similar problem by sorting the records, and then create a fictitious client record and enter that information into the data base.

Unit 4

Maintaining Client Schedules

This unit described why many speech and hearing facilities may determine that it is advantageous to utilize the microcomputer to maintain client schedules and attendance records. Two primary purposes were given: 1) the microcomputer allows easier scheduling for large numbers of clients; and 2) it allows the clinic to produce information on the total number of contact hours, contact hours for respective clinicians, and contact hours for respective pathologies.

Objective:

The students were required to describe two reasons why the microcomputer will help the clinician by maintaining client schedules.

Laboratory:

There was no laboratory for this section due to the unavailability of software.

Unit 5

Maintaining Therapy Data

This unit focused on the advantages of maintaining client therapy data on the microcomputer. The students were taught that data can be retrieved easily for the purpose of 1) conducting experimental analysis on therapy data, 2) providing comparative information on results of similar clients and 3)

comparing results of similar or different types of therapy programs.

Objective:

The students were required to describe three reasons why the microcomputer will help the clinician by maintaining therapy data.

Laboratory:

For this laboratory the students utilized Therapy Data Collector. There were two tasks for this laboratory. First the students were instructed to access the therapy data files of two clients, previously stored on the diskette. The students were then required to determine the primary disorder of the two individuals and the number of goals listed for each client. The second half of the laboratory required that they create a fictitious client therapy data file. First they were required to enter demographic information such as name and date of birth and then were instructed to enter three goals and append three pieces of data to the first goal. Finally, they were required to print out their fictitious client therapy data file.

Unit 6

Introduction to Microcomputer Programming

It may sometimes be necessary to make modifications in a program for a particular client. This section demonstrated

that with only a few hours of programming training clinicians can make minor program modifications to meet individuals' training needs. The five BASIC statements trained were: 1) PRINT, 2) INPUT, 3) IF...THEN, 4) GOTO, and 5) GOSUB.

Objective:

The students were required to describe the purpose of five BASIC programming statements (e.g. PRINT command). The students were required to indicate why minimal programming experience may be necessary for minor programming modifications.

Laboratory:

The purpose of this laboratory was to demonstrate to the students that with minimal training in programming they could modify a microcomputer program. The assignment was to make programming modifications on the Guess The Number program used in a previous laboratory. Specifically, the students were to change the instructions of the game thereby improving its potential interest for adults.

Unit 7

Word Processing

This unit of the course demonstrated to the students the capability of word processing in that it allows the clinician to change any part of a written report without retyping major sections. For example, one word can be easily changed in the

middle of a report, and sentences and whole paragraphs can be rearranged. If a hard copy of a report is required a printer can print it out automatically. Specifically, word processing allows the clinician to compose written material, easily make changes at a later time, and store large amounts of written material on a diskette.

Objective:

The students were required to list five specific functions of word processing programs (e.g. replace a word, move a line, etc.). Additionally, the students were required to describe the advantages of using word processing.

Laboratory:

There were two laboratories for this unit. The first introduced the students to word processing using a modified version of the Tutorial program in the Applewriter software. This program introduced the students to several word processing capabilities such as cursor movement and text scrolling. The second section of the laboratory was designed to teach students to create a piece of written material, change certain items in it using the delete functions, save the material on the diskette, and print out the material. This laboratory also required that the students alphabetize a bibliography using only the move functions of the program without re-typing the citations and print the alphabetized bibliography.

Unit 8

Assessment

This unit of the course focused on various benefits of using microcomputers in assessment in that it can assist the clinician in the administration, scoring, and analysis of language assessments. There are few estimates on the number of language assessments given to communicatively handicapped individuals in the country. One recent survey (Rushakoff and Johnson, 1979) indicated that the total number is estimated to be into the tens of thousands every year. Language test administrations account for a significant time factor that if reduced would allow the clinician additional time for other clinical activities. In many cases the client may be able to take a computer-assisted language comprehension examination. The microcomputer can also analyze and store the test results. Specifically, microcomputer assessments have the potential to 1) save clinician time, 2) present the assessment in a standard manner, 3) score the assessment, and 4) analyze the results.

Objective:

The students were required to describe three potential advantages of computerized language assessments.

Laboratory:

This laboratory required the students to use the microcomputer to administer a model microcomputer program based on the Carrow Test of Auditory Comprehension of Language (Carrow,

1974). When the assessment begins three pictures appear on the screen and the microcomputer then presents the verbal stimulus for that plate using a speech digitizer. The students were required to respond by touching one of the pictures with a light pen. This process continued for the eight plates in this program. The students then reviewed their scores on the monitor and printed out a hard copy of their assessment results.

Unit 9

Therapy

This unit of the course focused on the benefits of utilizing the microcomputer to assist in the habilitation process. There are many therapeutic procedures that can be replicated, to a certain degree, by the microcomputer, permitting many communicatively impaired individuals to fulfill at least some of their therapy through independent work with the microcomputer. The system is able to store the therapy data allowing the clinician to determine the client's level of functioning. Microcomputer based therapy has the potential to offer a new mode of treatment for the communicatively impaired. Specifically, the microcomputer can 1) facilitate the client's rate of habilitation since the clinician only has a finite amount of direct contact hours available; 2) free the clinician of some direct contact time in order to increase

therapy time required for more complex cases; and 3) help those communicatively impaired individuals who do not have access to clinical treatment facilities on a regular basis.

Objective:

The students were required to list three reasons why the microcomputer can assist the clinician and the client in certain types of therapy programs.

Laboratory:

There were two laboratories for this section. The first required the students to utilize The /s/ Meter, a program which allows individuals to practice and maintain their correct production of the /s/ phoneme. The students were instructed to produce a series of words with /s/ in the initial position and indicate on their laboratory assignment sheets in what manner the program provided both feedback and reinforcement when the production was incorrect, distorted, and correct. The second laboratory utilized Sentence Structure, a program designed to provide feedback for appropriate written syntax. The students were required to produce three syntactically incorrect sentences and three syntactically correct sentences and to indicate on their laboratory sheets the feedback and reinforcement provided by the program.

Unit 10

Non-Vocal Communication

This unit demonstrated to the students that the microcomputer can function as a communication and comprehensive living aid for many non-vocal, severely physically impaired individuals. Specifically, it can serve as a 1) speech-output, customized vocabulary communication aid; 2) writing tool with editing and printing capabilities; 3) device to facilitate learning in academic subjects; 4) vehicle for enjoying and creating art and music production; 5) device that can be used for leisure and recreation activities; 6) record keeping system; and 7) vehicle for obtaining vocational skills.

Objective:

The students were required to describe six ways the microcomputer can be utilized to benefit non-vocal, severely physically impaired clients.

Laboratory:

In this laboratory the students learned to operate TALK II, a program that turns the microcomputer into a versatile speech output communication aid for non-vocal, severely physically impaired individuals. They were required to create messages, speak it, print it out, and then save it in the program.

Unit 11

Data Analysis, Statistics, Research

This unit focused on the benefits of utilizing the microcomputer to assist the clinician in conducting research activities since as more research projects are being developed by practicing clinicians, the information acquired from them may prove beneficial in the assessment and treatment of communicatively handicapped individuals throughout the country. Although there has been a lack of research from public school clinicians (Laney, 1982), the microcomputer will allow the clinician to perform experimental and descriptive research without having the computer data analysis performed elsewhere. Practicing clinicians who would like to conduct research at their facility may be able to with a microcomputer equipped with a package of statistical programs. Statistical microcomputer programs are now user-oriented; they can be utilized by individuals with no technical computer experience by following the directions that appear on the monitor. Such programs will benefit the clinician in that statistical analyses may be performed immediately.

Objective:

The students were required to list three reasons why statistical and data analysis programs will help the clinician and the profession by providing field based descriptive and experimental research.

Laboratory:

For this laboratory the students were given an experimental hypothesis and raw data to test that hypothesis. The hypothesis stated was as follows: Children who are hearing impaired will obtain lower raw scores on the Peabody Picture Vocabulary Test (Dunn, 1959) than normal hearing children when age, intellectual abilities, and social status are controlled. For the laboratory the students were provided fictitious raw data for the two groups of children. They were required to utilize three statistical programs on the raw data. The first allowed them to calculate the mean and standard deviation of the raw scores for both groups of children. The second statistical program allowed them to determine the standard deviation of each hearing impaired childs score. The third statistical test, the Student's t-test, was calculated to determine whether the differences in the raw scores of the two groups of children were statistically significant.

Measurement

The following section describes the manner in which the five hypotheses were tested.

Hypothesis 1

A survey (Appendix A) was mailed to all of the 88 universities on the National Council of Graduate Programs in Speech and Language Pathology and Audiology (1979). The list

was taken from the 1979-80 council directory. The survey packet consisted of 1) a cover letter explaining the purpose of the survey and requesting their participation, 2) a description of the proposed University of Florida, Clinical Microcomputer Applications course, 3) a survey on their use of microcomputers and reactions to the course, Clinical Microcomputer Applications, and 4) a self-addressed, stamped envelope.

Hypothesis 2

All students enrolled in the Clinical Microcomputer Applications course were given a pre-test during the first 30 minutes of the first class (Appendix B). The same test was administered during the regularly scheduled final examination period at the termination of the course.

Hypothesis 3

On the last day of class all of the students enrolled in the Clinical Microcomputer Applications course were given a questionnaire (Appendix C) related to their perceived usefulness of the course material. The same survey was also administered to the students enrolled in two other graduate level clinical courses.

Hypotheses 4 and 5

At the end of the course (semester) all of the students enrolled in the Clinical Microcomputer Applications course

were given a questionnaire (Appendix D) regarding their perceptions of each course unit relative to the rationale provided for that unit, the support of that unit provided by the laboratory and the adequacy of emphasis given to that unit.

CHAPTER III
RESULTS

The purpose of this study was to develop, validate, and implement a new course of instruction in Clinical Microcomputer Applications. The results of the mail survey, student pre/post-test, and course ratings are presented.

The results of the experimental hypotheses are presented in the following sections 1) validation of the course curriculum by respondents from university speech and hearing programs, 2) mastery of objectives by students registered in the experimental course, 3) comparison of students' responses to the content of the experimental course with students' responses from two control courses, 4) analysis of the content of the experimental course based on students' responses, and 5) comparative analyses of students' responses to each unit in the experimental course.

Validating Course Curriculum

Question: Do respondents from university speech and hearing programs consider the experimental course to be valid for its stated purpose.

Fifty-eight (63%) of the representatives from university speech and hearing programs responded to the mail survey. When requested to review the course content, 35 (70%) respondents, of the 50 who answered this question, felt that there were no additional major areas to be added to the course outline (see Table 2). Fifteen (30%) felt there were other major areas that needed to be added. The two major areas recommended for inclusion were 1) teaching a computer language in order to develop programming skills, and 2) utilizing the microcomputer in audiology assessment.

When requested to determine whether any of the areas in the course content should be deleted 25 (93%) of the respondents to this question felt that no area presented in the course description should be deleted (see Table 3). Two (7%) respondents stated that minor changes were needed to allow more time for the content areas they considered more pertinent. One respondent felt that maintaining client records should be deleted so that more time could be spent on teaching programming skills. The second respondent did not feel that microcomputer assessment, client records, scheduling, statistics, and use as an aid for the non-vocal severely physically impaired were needed for this course.

It appears that the curriculum of the Clinical Microcomputer Applications course was considered appropriate (i.e. valid) by the representatives providing responses from 58 university speech-language and hearing departments.

Information related to actual usage of microcomputers in university speech and hearing departments was also requested in the mail survey. Twenty-four (41%) of the respondents indicated that their speech and hearing departments and/or clinics have at least one microcomputer (see Appendix H). The specific brands of the systems are also included. These categories were not mutually exclusive since some departments had more than one brand of microcomputer. Of those who did not have a microcomputer, 15 (44%) indicated that they would consider purchasing one if funding were available. Seven (21%) stated that they have considered purchasing a microcomputer but that it had not been given a high priority in their budget. Five (15%) stated that have considered purchasing a microcomputer but have no staff member who could provide instruction in this area. Only two (6%) stated that they had not considered purchasing a microcomputer for their department or clinic.

The mail survey also requested that the respondents rank the top three clinical and administrative applications (out of 13 given) for which they plan to use their system if they have a microcomputer or if they were planning to purchase one

(Appendix H). Word processing was ranked as the number one priority use most frequently. However, maintaining client records received the overall largest number of responses. Other areas that received a large number of responses were maintaining student clock hours, statistical analyses, and computer-assisted-instructional programs for students. Using the microcomputer to provide therapy and administer clinic assessments were among those uses that received few responses.

Results from the mail survey also provided data on software development in speech and hearing programs. Thirteen of the 24 who responded to this question indicated that they have already developed speech and hearing related software. Nineteen of the 24 who responded indicated that they are now in the process of developing speech and hearing related software. Percentages were not calculated for this question as the categories were not mutually exclusive.

Seven (13%) of the 52 respondents to this question stated that they are currently offering an academic and/or laboratory course for credit on microcomputer applications for speech-language and hearing clinicians. Of the 43 respondents who answered the question regarding plans to offer such a course, 40 (93%) indicated that they have no plans to offer such a course in the next two years.

Table 2

Summary of Responses to Question
Addressing Need for Coverage of Additional Content

YES (It covers all major areas)

35 (70%)

NO (It needs other areas)

15 (30%)

4	Programming (whole language)
6	Audiology assessment
1	Acoustic analysis (synthesis)
1	Hardware functioning
1	Cost accounting; Accounts receivable; Bookkeeping
1	Research applications

Note: Nine of the 58 participants did not respond to this item.

Table 3

Summary of Responses to Question
Addressing Need to Delete Curriculum Areas

YES (There are areas in the course that should not be included)

2 (7%)

Response #1 - Take out Client Records (for more programming)
Response #2 - Not interested in assessment, statistics, aid for PI, schedule and client records.

NO (There are no areas in the course that should be deleted)

25 (93%)

Note: Thirty of the 58 participants did not respond to this item.

Mastery of Objectives

Question: Did all of the students registered in the experimental course obtain a post-test score above 75%?

The purpose in administering a pre-test was to determine the students' level of knowledge in the area to be taught. Scores on the pre-test served as a baseline indicator of level of knowledge in microcomputer applications. The post-test was administered to determine the extent to which the information provided in the course had been learned. The mean percentage score for the pre-test was 32% with a range of 10 - 46%. The mean percentage score for the post-test was 96% with a range of 88 - 100%. All students obtained a post-test score above 75% of the total score possible (see Table 4). It appears that students entering the Clinical Microcomputer Applications course with low levels of knowledge were able to master appropriate (i.e. valid) content as a result of participation in carefully planned instruction.

Interrater reliability was established between the investigator and a second judge for the pre and post-test scores. This was necessary due to inherent bias associated with the investigator being responsible for scoring the pre and post-tests. The second judge scored a randomly selected sample of 25% of the pre-test and post-test data. A Pearson

product-moment correlation was used to determine the strength of the relationship between the two judges. Correlations of .97 and .99 were found for the pre and post-test respectively.

Table 4

Description of Student Performance
On Pre and Post-Test

Subject	Pre-test		Post-test	
	Num.	%	Num.	%
1	5	10	48	92
2	22	42	50	96
3	15	29	51	98
4	16	31	52	100
5	19	36	52	100
6	19	36	46	88
7	15	29	50	96
8	22	42	50	96
9	12	23	50	96
10	11	21	52	100
11	24	46	47	90
12	18	35	50	96
$S\ \bar{X}$	16.5	31.7	49.8	95.7
S.D.	(5.38)	(10.2)	(1.86)	(3.9)

Note: Total points possible was 52.

Comparison of Experimental Course with other Graduate Courses

Question: How do students' ratings of the experimental course compare with students' ratings of two control courses?

Students' ratings of the Clinical Microcomputer Applications class compared favorably with the ratings of students registered in two graduate core clinical courses (see Table 5). In only two instances were the results from the experimental course significantly different from one of the control courses. In each of these cases the experimental course was rated higher than the control course. As noted in Table 5, students in the experimental course gave perfect ratings to two questions, indicating that the rationale for the course was clearly presented and supported and the objectives for the course were met given the length of time available.

Table 5

Students' Perceptions of Clinical Importance

Question	Exper. Course	Control Course 1	Control Course 2
	Mean (S.D)	Mean (S.D.)	Mean (S.D.)
Rationale	4.0 (0.0)	3.8 (0.4)	3.1 (1.0) *
Objectives	4.0 (0.0)	3.8 (0.4)	2.7 (1.2) *
Significance	3.8 (0.4)	3.8 (0.4)	3.4 (0.9)
Employment	3.8 (0.4)	4.0 (0.3)	3.1 (1.1)
Breadth	3.5 (0.5)	3.9 (0.4)	3.1 (1.1)
Offered	3.8 (0.4)	3.3 (0.4)	3.1 (1.3)

Note: Significant differences indicated by *
$p < .05$

Content Analysis of Experimental Course

Question: How was each unit of the course rated relative to the areas of rationale, laboratory support, and emphasis?

In response to the question regarding the adequacy of the rationale, the results indicate that each unit received a strong agreement rating, in the range of 3.67 to 4.00. The mean and standard deviation of each unit reflect the extent to which the rationale for inclusion of that unit was adequately presented (see Table 6).

Relative to the question of laboratory support for each lecture unit, the mean and standard deviation of students' responses indicate that the laboratories strongly supported their corresponding lecture units (see Table 7).

In response to the question of adequacy of emphasis for each of the units, students reported that most of the units were given an adequate amount of emphasis. The means and standard deviations for each unit reflect the extent to which the unit received 1) too little emphasis, 2) adequate emphasis, or 3) too much emphasis. The results indicate the none of the units were given too much emphasis (see Table 8). Two units, word processing and using the microcomputer as an aid for non-vocal, severely physically handicapped individuals, received ratings of too little emphasis. One student's responses to this question could not be included because an incorrect answer key was used in response to these

questions. Relative to the analysis of the experimental course content, it appears that the students felt that nine of the eleven units received adequate emphasis.

Table 6

Was The Rationale For Each Section Adequately Presented?

	UNIT AREA	MEAN	S.D.
1)	Overview	4.00	0.00
2)	Equipment	3.92	0.29
3)	Word processing	3.92	0.29
4)	Aid for Non-Vocal, SPH	3.67	0.49
5)	Data analysis; Statistics	3.75	0.45
6)	Programming	3.67	0.49
7)	Client Records	3.83	0.39
8)	Therapy Data	3.83	0.39
9)	Client Schedules	3.83	0.39
10)	Assessment	3.75	0.45
11)	Therapy	3.75	0.45

Note: 1= Strongly Disagree
2= Disagree
3= Agree
4= Strongly Agree

Table 7

Did The Laboratory Support The Lecture?

	UNIT AREA	MEAN	S.D.
1)	Overview	3.75	0.45
2)	Equipment	3.92	0.29
3)	Word processing	3.92	0.29
4)	Aid for Non-Vocal, SPH	3.67	0.49
5)	Data Analysis; Statistics	3.67	0.49
6)	Programming	3.58	0.51
7)	Client Records	3.83	0.39
8)	Therapy Data	3.83	0.39
9)	Client Schedules	(No Laboratory)	
10)	Assessment	3.33	0.65
11)	Therapy	3.25	0.87

Note: 1= Strongly Disagree
2= Disagree
3= Agree
4= Strongly Agree

Table 8

Did Each Unit Receive Adequate Emphasis?

	UNIT AREA	MEAN	S.D.
1)	Overview	2.00	0.00
2)	Equipment	1.91	0.30
3)	Word processing	1.73	0.47
4)	Aid for Non-Vocal, SPH	1.73	0.47
5)	Data Analysis; Statistics	1.82	0.40
6)	Programming	1.78	0.44
7)	Client Records	2.00	0.00
8)	Therapy Data	1.91	0.30
9)	Client Schedules	1.91	0.30
10)	Assessment	1.82	0.40
11)	Therapy	1.80	0.42

Note: 1= Too Little Emphasis
2= Adequate Emphasis
3= Too Much Emphasis

Content Comparison Between Units

Question: How did the course units compare to each other relative to rationale, laboratory support, and emphasis?

All of the content units received ratings above 3.6 in terms of adequacy of rationale presented for each unit. The overview received a perfect rating of 4.0. Introduction to the equipment and word processing received the next highest ratings of 3.92. Introduction to programming and using the microcomputer as an aid for the physically handicapped received the lowest scores, both received ratings of 3.67 (see Table 9).

Relative to the question of the laboratory supporting the lecture unit, introduction to the microcomputer equipment and word processing received the highest scores of 3.92 respectively. Assessment and therapy received the lowest scores of 3.33 and 3.25 respectively (see Table 10).

Students' responses to the adequacy of emphasis given to each unit indicated that none of the units were given too much emphasis. Using the other answer key (1= too much emphasis, 2= adequate emphasis, 3= too much emphasis) word processing and using the microcomputer as an aid for the non-vocal, severely physically handicapped received the highest scores on this question of 1.73 each for too little emphasis given (see Table 11). The course overview and client records received perfect scores of 2.00 for adequate emphasis. The students' raw score

distributions for this question are presented in Table 12. This table presents a delineation of students' responses relative to their perceptions of the degree of emphasis given to each of the units.

Table 9

Means and Standard Deviations of Students' Responses to Question Addressing Rationale for Unit

	UNIT AREA	MEAN	S.D.
1)	Overview	4.00	0.00
2)	Equipment	3.92	0.29
3)	Word processing	3.92	0.29
4)	Client Records	3.83	0.39
5)	Therapy Data	3.83	0.39
6)	Client Schedules	3.83	0.39
7)	Assessment	3.75	0.45
8)	Therapy	3.75	0.45
9)	Data analysis; Statistics	3.75	0.45
10)	Aid for Non-Vocal, SPH	3.67	0.49
11)	Programming	3.67	0.49

Note: 1= Strongly Disagree
2= Disagree
3= Agree
4= Strongly Agree

Table 10

Means and Standard Deviations of
Students' Responses to Question
Addressing Laboratory Support

	UNIT AREA	MEAN	S.D.
1)	Equipment	3.92	0.29
2)	Word processing	3.92	0.29
3)	Client Records	3.83	0.39
4)	Therapy Data	3.83	0.39
5)	Overview	3.75	0.45
6)	Aid for Non-Vocal, SPH	3.67	0.49
7)	Data Analysis; Statistics	3.67	0.49
8)	Programming	3.58	0.51
9)	Assessment	3.33	0.65
10)	Therapy	3.25	0.87
	Client Schedules	(No Laboratory)	

Note: 1= Strongly Disagree
2= Disagree
3= Agree
4= Strongly Agree

Table 11

Means and Standard Deviations of
Students' Responses to Question
Addressing Emphasis of Unit

	UNIT AREA	MEAN	S.D.
1)	Overview	2.00	0.00
2)	Client Records	2.00	0.00
3)	Equipment	1.91	0.30
4)	Therapy Data	1.91	0.30
5)	Client Schedules	1.91	0.30
6)	Data Analysis; Statistics	1.82	0.40
7)	Assessment	1.82	0.40
8)	Therapy	1.80	0.42
9)	Programming	1.78	0.44
10)	Word Processing	1.73	0.47
11)	Aid for Non-Vocal, SPH	1.73	0.47

Note: 1= Too Little Emphasis
2= Adequate Emphasis
3= Too Much Emphasis

Table 12

Distribution of Students' Responses
to Question Addressing Emphasis of Unit

	Too Little Emphasis	Adequate Emphasis	Too Much Emphasis
1) Overview		11	
2) Equipment	1	10	
3) Word Processing	3	8	
4) Non-Vocal, SPH	3	8	
5) Statistics	2	9	
6) Programming	2	7	
7) Client Records		11	
8) Therapy Data	1	10	
9) Client Schedules	1	10	
10) Assessment	2	9	
11) Therapy	2	8	

Note: 1= Too Little Emphasis
2= Adequate Emphasis
3= Too Much Emphasis

Summary of Results

Pre-test data on the students who registered for the experimental course demonstrated that they did not already have the information the course provided. The results of a post-test indicated that the students demonstrated a high level of achievement on the required objectives for the course.

In terms of rationale, content, and significance, students' ratings of the Clinical Microcomputer Applications course compared favorably with students' ratings of two other graduate, clinical courses. The students in Clinical Microcomputer Applications course rated all units and laboratories of the course highly. They felt that nine of the units were adequately emphasized in the course, no units had received too much emphasis, and two units should have been given more emphasis. Finally, respondents from 58 university speech-language and hearing departments generally agreed that the major content areas were appropriate for the course and that no areas should be deleted from the curriculum.

It appears that the students registered for the Clinical Microcomputer Applications course and the respondents from universities with graduate programs in speech-language pathology and audiology felt the course content to be valid and adequately comprehensive for inclusion in a curriculum for speech-language pathologists and audiologists.

CHAPTER IV
DISCUSSION

It was the purpose of this investigation to develop and evaluate an academic course of instruction which provides speech-language pathologists and audiologists with the basic knowledge and techniques necessary to evaluate and utilize the microcomputer for clinical and administrative applications. It has been demonstrated that the computer may serve multiple purposes in assisting the speech-language pathologist and audiologist in providing more services and better services to the communicatively impaired. The microcomputer is becoming increasingly available to all speech-language and hearing clinicians in various educational and clinical environments. In order to effectively utilize this new technology it is necessary to educate speech-language pathologists and audiologists through an academic and laboratory course of instruction.

The Clinical Microcomputer Applications course was designed and implemented for this purpose and was evaluated through 1) a mail survey to chairpersons of graduate programs in speech-language pathology and audiology, 2) a pre/post test administered to students registered in the experimental course, 3) comparative analysis of students' perceptions of

the experimental course with two graduate control courses, 4) an individual analysis of each content unit based on student responses, and 5) a comparison of each content unit based on ranking the student responses.

The results of the mail survey indicated that the curriculum content of the Clinical Microcomputer Applications course would be considered valid and comprehensive by representatives of universities with graduate programs in speech-language pathology and audiology. An analysis of the responses to the mail survey indicated that the majority of the respondents felt there were no other major areas that should be appended to the course. Several respondents indicated that using the microcomputer for clinical audiologic assessments should be included. However, this topic was included under the unit area of assessment which was already contained in the course content. A few of the respondents stated that a computer programming language should be taught. One respondent felt that this course should not be taught by speech and hearing departments but rather by computer science departments.

Seven (13%) of the respondents stated that they currently have some form of lecture and/or laboratory credit course of instruction in the clinical applications of microcomputers. Of the 45 universities that do not offer a credit course in microcomputer applications, 40 (93%), out of the 43 who

responded, stated that they do not plan to offer a microcomputer course within the next two years. It was also interesting to note that 24 (41%) of the universities in the sample currently have at least one microcomputer in their speech and hearing department and/or speech and hearing clinic. Of the 34 (59%) departments that do not have a microcomputer, none indicated that they have current plans to obtain one.

All students were expected to obtain a score of 75% or above on the post-test. The students met this objective and in fact exceeded the 75% criterion established as indicated by the mean score of 32% on the pre-test and 96% on the post-test. The instructional techniques and materials included in the course (lectures, laboratories, handouts, demonstrations) proved to be effective, based on the students' success with the laboratories and their comments on the course questionnaire regarding the instructional techniques. The course provided training necessary for the student to become knowledgeable in the role of microcomputers in speech-language and hearing applications. It was apparent that all students who participated in the course gained an understanding of the clinical uses of microcomputers.

In order to determine that students perceived the experimental course as potentially useful in obtaining employment and preparing them to provide better clinical

services, their responses on the course questionnaire were compared to the responses on the same questionnaire from students in two other graduate, core clinical courses. Students' ratings in the Clinical Microcomputer Applications course as compared to students' ratings of two other core courses suggest that the experimental course was considered to be both relevant and important addition to graduate academic training in speech-language pathology and audiology. For example, using a four point agreement scale with 4.0 being the highest rating of agreement, the students in the experimental course had a mean response of 3.8 to the question "I clearly understand the clinical significance of the material presented." Students in the two control courses had mean responses of 3.8 for control course 1 and 3.4 control course 2. When asked whether the breadth of material presented in the course would have a significant effect on their clinical skills there was no statistical difference between the mean score for the experimental course (mean 3.5) and the two control courses (mean 3.9 and 3.1). There were also no significant differences when the students were asked if they felt that the material presented in the course would increase their employment opportunities.

In an anonymous questionnaire most students in the Clinical Microcomputer Applications course indicated that they would like to know more about microcomputer applications in

speech-language and hearing. They also strongly agreed that they would now probably learn more about clinical microcomputer applications on their own and that they now felt qualified to provide a strong rationale for the clinical and administrative uses of microcomputers in a speech and hearing facility.

Each course unit was analyzed relative to the rationale for including the unit, laboratory support for the unit, and adequate emphasis of the unit within the course. Each unit in the course was rated highly in terms of the rationale provided for inclusion of that unit. Also, all of the units received high ratings relative to the laboratory supporting the lecture unit. The laboratories were dependent on software that could be obtained to support a particular lecture unit. At the time the course was offered there were still few quality examples of microcomputer therapy and assessment software.

Since the cumulative time the class spent on the laboratories required between 4-10 hours of computer time each week, it was not possible to have the course instructor present during each student's laboratory period. The key to the efficient use of this course of instruction was the development of hand-holding laboratories which would 'talk' the student through each step. For example, in the first laboratory it was explained precisely how to hold the diskette in order to insert it in the disk drive and then instructed

the student to close the disk drive door. On occasion, a very simple step was found to be missing from the laboratory instructions. Students who had laboratories early in the week were sometimes unable to solve the problem. Once the missing instruction was identified the investigator made available the information for the remaining students. In the first few laboratories the instructions provided a step-by-step progression. This was especially critical during the first two or three laboratories when the students were still unfamiliar with the basic operations of interactive microcomputer programs.

The students felt that most of the units received adequate emphasis with the exception of two, learning word processing and using the microcomputer as an aid for non-vocal, severely physically handicapped individuals. The perceived need for more emphasis on microcomputer applications for non-vocal, severely physically handicapped individuals was understandable considering that two special education majors had registered for the course and both were involved in programs for the physically impaired. Also, one of the working speech pathologists was employed in a school with a program for physically handicapped children and two of the other graduate students had recently been assigned a physically impaired child at the university speech and hearing clinic. Unfortunately, since the course met for only two hours a week,

there was not enough time to provide comprehensive coverage for any of the individual content areas.

It is clear from students' responses on the questionnaire that all of the content units were rated comparably relative to rationale for inclusion of the unit, laboratory support, and adequacy of emphasis. Although each unit received an agreement rating above 3.6 for rationale, programming skills and using the microcomputer as an aid for the severely physically impaired were rated the lowest. This appears to be inconsistent with students' responses indicating that the unit on using the microcomputer as an aid for the non-vocal, severely physically handicapped child was given too little emphasis. Assessment and therapy units, although both received agreement ratings above 3.2, were rated the lowest relative to the adequacy of laboratory support for the lecture unit. These low ratings for assessment and therapy were expected due to the limited availability of software for those laboratories at the time of the course. However, that low rating by students should change for future classes as many microcomputer assessment and therapy programs become available (Fitch, 1982). In terms of emphasis of the units, the data indicates that all of the units were adequately emphasized for the stated goals of the course. None were rated as receiving too much emphasis in the course.

Hardware, Software and Programming

One question that had to be addressed in the design of the Clinical Microcomputer Applications course was the extent to which a detailed understanding of the microcomputer hardware and programming skills would be included. Since the objective of the course was to train clinicians in the benefits of using the microcomputer, it was necessary to determine the extent to which programming and hardware concepts would be required to accomplish that objective.

In designing the course rationale and content it was felt that very little hardware information and programming skills were necessary for successful use of the system for administrative and clinical purposes. In terms of hardware, it was necessary to determine which equipment specifications clinicians would need to understand in order to purchase a microcomputer system for their clinic or school. For example, they needed to know the basic components of a system 1) microcomputer, 2) disk drive, 3) monitor, and 4) printer. They also needed to have decision making skills for determining what model of microcomputer to purchase. A key point to be considered by the students was the availability of software for the various models. Only a few other system specifications were considered necessary for inclusion in this applications-based course. For example, microcomputers are

available with differing amounts of random access memory (RAM). It was necessary for students to understand RAM in order to purchase a functional system.

Unsolicited statements from students who were considering registering for the experimental course and clinicians at other professional meetings seems to indicate that many clinicians and students feel programming skills are prerequisite for the successful clinical and administrative use of microcomputers. In designing the Clinical Microcomputer Applications course, the students were taught that programming skills were not required for successful use of the microcomputer. If quality software are being used, there should be no need for the clinician to have specific programming skills. Students in the experimental course were taught to consider the following specific questions when considering purchasing software.

1) Does the software have a clear purpose or objective?
2) Is that objective worthwhile to the clinician?
3) Is there any information available to insure that the program accomplishes the stated objective?
4) Is the program reasonably clear to use without extensive background and training?
5) If the program is not self-explanatory while it is operating, does it have printed information (documentation) to assist in utilizing it?

6) If there are unanswered questions related to its use, is there a source for further information support?

Need for Faculty Training

It is apparent that the microcomputer will play a critical role in future speech-language pathology and audiology services. There is evidence of its growing significance in the number of studies that have utilized and/or investigated the use of microcomputers for analyzing client records, assisting in therapy, and performing assessments, data analysis, client scheduling and word processing. However, current literature represents only a small degree of the potential of microcomputer use in speech and hearing facilities. Indeed, important investigative thrusts in every area of microcomputer research could develop if more university speech-language and hearing faculty learned about microcomputers and their applications.

There are many potential vehicles for faculty training in the clinical application of microcomputers. Although there is still very little comprehensive information in the literature, there is a marked increase in the number of microcomputer short courses being offered at state and national speech-language and hearing conventions. Current plans of the

ASHA Committee on Educational Technology include a national convention on microcomputer applications in speech-language and audiology. This committee has also published a software registry (Fitch, 1982) which will provide for the wider dissemination of speech-language and audiology related software.

The development of software relating to speech-language and hearing has been accomplished by few facilities. However, this is expected to change. The current survey of microcomputer use in universities with graduate programs in speech-language pathology and audiology, found that 38% of speech-language and hearing departments have at least one faculty member developing speech, language and hearing related software. It is even more encouraging to note that 92% of the departments that have microcomputers have developed and/or are currently developing software. This should increase markedly as more faculty and clinicians become familiar with the microcomputer and its potential in clinical situations.

In order for clinicians to develop the skills necessary for a comprehensive understanding of the microcomputer, teaching materials on microcomputer applications must be documented and disseminated. Also, texts and monographs concerning computing skills, research applications, and the microcomputer's role in speech-language pathology and audiology are needed. Instruction in microcomputer

applications must be implemented in speech-language and hearing curricula to provide relevant, in-depth learning situations about the microcomputer and to increase the number of clinicians knowledgeable in microcomputer applications.

Implications for Future Research

The investigation and documentation of microcomputer uses is in a very early stage of development. Many research projects will be required to obtain valid and reliable use of this device. For example, assessment programs could provide clinicians with tools that would not only save time but assist in teaching the clinician about decision-making in the assessment process. Microcomputer assisted assessments could also insure greater accuracy in test scoring, item analysis, and skill sequencing for presentation.

In 1975, before the proliferation of microcomputers, Fitch and Terrio discussed the possibility of using computers to assist in the continued training of working clinicians. With the recent proliferation of microcomputers in the public schools the microcomputer can serve as an interactive instructional assistant for clinicians in need of updating their clinical skills. Specifically, a program disk on a topic area could provide clinicians with new information by providing an interactive program which requires responses from

the clinician. Such programs could provide clinicians with information on their performance relative to the teaching material on the program disk. Since microcomputers are now available in many public schools, clinicians may be able to utilize the continuing education program disks during time periods when the microcomputers are not being used for other purposes. The thrust toward continuing education is growing in the area of speech-language pathology and audiology. As new information is developed and disseminated, it becomes critical for clinicians to utilize that information in their clinical services. The microcomputer offers a vehicle for aiding clinicians in updating their knowledge in newly developed areas. The efficacy of microcomputer assisted instruction in continuing education has yet to be investigated.

Progress in the area of microcomputer assisted speech therapy is directly related to the continuing technical advancements in speech recognition devices for microcomputers. As these technical developments occur, microcomputer augmented speech therapy will become increasingly important. It is the speech output and speech recognition units which will prove valuable in speech, language and aural rehabilitation programs. As the devices become more effective, more software utilizing them will be developed and assessed for their clinical utility.

Storage and retrieval of information is critical to an understanding of the various factors related to the etiologies of communicative disorders and the habilitation techniques used to remediate them. As the use of microcomputers to store client records and therapy data increases, clinicians and researchers will have ready access to information that may change our understanding of the variables associated with certain communicative disorders. This information should also provide a much wider sample to document the effectiveness of the many techniques, programs and materials used by clinicians. With the use of modems, a device to transfer information from one computer to another over the telephone, microcomputers can convey information from one clinic to another. Researchers will have the ability to collect larger samples of data in order to obtain a more representative sample which provides for a greater generalizability of their data.

Additionally, the role of the microcomputer as a computational tool may prove to have the most significant impact on developments in speech-language and hearing research. No programming knowledge is required to utilize statistical analyses programs. Ease of utilization coupled with the fact that analyses can be completed in a few moments and accomplished at the clinician's speech and hearing facility may greatly increase both the quality and quantity of descriptive and comparative experimental research in sites other than universities.

Although long-term investigations continue to establish the microcomputer as a clinical and administrative aid to speech-language and hearing clinicians, certain questions remain unanswered. Documentation of effectiveness of microcomputer assisted therapy programs is lacking. Wilson and Fox (in press) have been evaluating language therapy software that they have developed. Fortunately, their work has investigated not only the effectiveness of the program, but also the efficiency. For example, for programs that require the use of "pages" of pictures to elicit client responses, the Apple II microcomputer requires several seconds to load each new graphics page (picture). Their research team produced a program in which each graphic requires only one half second to appear. Such developments markedly increase the efficiency of potential therapeutic software. Sufficient documentation of the effectiveness of microcomputer therapy programs should provide the impetus for clinicians to begin to investigate the myriad of microcomputer applications in the field of communicative disorders.

Also, documentation of the validity and reliability of microcomputer assisted assessments will be needed. Telage (1980) and Fields and Renshaw (1978) have argued that the computer assisted assessments will provide a significant savings in time for clinicians. However, the literature has yet to document the effectiveness of long-term computer

assisted assessment software. In fact, it appears that there are currently no documented investigations of computer assessments which have been field tested by clinicians who are not directly affiliated with computer research projects.

Coursework After Clinical Microcomputer Applications

The primary objective for the Clinical Microcomputer Applications course was to allow clinicians to successfully utilize the microcomputer for a variety of administrative and clinical purposes. For some clinicians, this may be a reasonable, terminal objective. However, the investigator felt that clinicians should also be responsible for designing and developing software and for evaluating the effectiveness of software developed by others in order to recommend specific hardware and/or programming changes to program developers. In some cases, clinicians may wish to create hardware and software modifications for their own clinical requirements. For example, they may wish to modify a microcomputer therapy program that utilizes the keyboard as the input mechanism and modify the program to utilize a light pen for information input. In some instances clinicians may wish to have the skills to design a program and perform the actual computer programming themselves.

Two additional courses of instruction may be needed to accomplish all of the goals stated above. A follow-up course to Clinical Microcomputer Applications should teach clinicians more of the inner workings of the microcomputer and peripherals with the objective to modify existing programs and possibly design clinical programs. For example, certain language therapy programs that use keyboard or light pen inputs may prove to be more effective if modified to utilize a monitor that allows input by touching the screen. A more detailed study of computer programming would allow clinicians to perform their own modifications to the program. For those clinicians who wish to design and perform their own computer programming, there are already many courses available through universities, community colleges and non-credit community education programs.

Summary

The microcomputer has the potential to be the most influential and important clinical tool for the future of speech-language pathology and audiology. Continued research and technological progress in ensuing years undoubtedly will contribute to the role of the microcomputer in clinical applications. The significance of that role will depend largely upon the success of speech and hearing faculty in implementing clinical research and instruction in the use of microcomputers.

APPENDIX A

MAIL SURVEY

Dear Colleague,

We are conducting a short survey of microcomputer use and applications in Speech and Hearing Departments. The purposes of this survey are twofold. First, we hope to obtain general information on the use of microcomputers in Departments of Speech Pathology and Audiology. Second, we would like you to respond to a preliminary course outline on microcomputer instruction for Speech-Language Pathologists and Audiologists.

If you have microcomputers and someone else is responsible for them, please pass this survey to them.

For the purpose of this survey, microcomputers are defined as 'stand-alone' computer systems that are commercially available such as the Apple][, TRS-80, Commadore Pet, Atari, OSI, etc.

We would appreciate your participation in this survey. Please fill out and return the survey (yellow sheets) in the enclosed stamped envelope. Again, your cooperation in this project is greatly appreciated.

Sincerely yours,

Linda J. Lombardino, Ph.D.
Department of Speech

Gary E. Rushakoff, M.A.
Department of Speech

(Please Return This Section)
SURVEY

1. Does your department and/or Speech and Hearing Clinic have a microcomputer?

   Yes No

   If yes, (how many)

   Apple][
   TRS-80
   Atari
   OSI
   Commadore PET
   IBM (Personal Microcomputer)
   Other

2. If not, does your department and/or Speech and Hearing Clinic have plans to get one or more?
   Yes No

   If you don't have one please indicate the reason(s) below:

   Have not considered purchasing one
   Have considered purchasing, but has not been given high priority
   Have considered purchasing, but no staff to teach its utilization
   Would purchase if funding was available
   Other (please explain)

3. If you have a microcomputer or are planning to get one, please rank order the top three applications for which you have been/will be using your microcomputer over the next two (2) years?

   Word Processing
   Student Clock hours
   Student Grades
   Departmental Budget Accounts
   Clinic Client Records
   Clinic Schedules
   Teaching Computer Programming to Students
   Instructional Courses for Students
   Statistical Analysis
   Provide Therapy
   Administer Clinic Assessments
   For Physically Handicapped Clients
   Maintaining Client Therapy Data
   Others - Please explain:

4. If you have a microcomputer, has your department:

   Already developed speech and hearing related software
   In the process of developing speech and hearing related software
   Have not developed any software
   Other (please explain)

5. Does your Speech and Hearing Department offer an academic and/or laboratory course for credit on microcomputer applications for Speech-Language and Hearing Clinicians?

   Yes No

6. If not, are you currently planning to offer such a course within the next two (2) years.

   Yes No

7. (Optional)
   Name of School:

8. Comments:

9. We are in the processing of validating a course in clinical microcomputer applications for Speech-Language and Hearing Clinicians at the University of Florida. Would you read the enclosed proposed course syllabus and respond to the following two questions.

A. Does the enclosed syllabus cover all the major areas that would be useful to Speech-Language Pathologists and Audiologists?
If not, what area(s) should be added?

B) In your opinion are any of the areas outlined on the syllabus unnecessary for inclusion in an academic/laboratory course of this nature?
If so, please explain.

COURSE SYLLABUS

Description:

The course will focus on the application of microcomputers in the discipline of Speech/Language Pathology and Audiology. The class will be conducted as a 60-90 minute lecture once a week and a 30-60 minute laboratory (to be conducted independently by each student) once each week. At the end of each lecture the students will be given a laboratory packet based on the lecture topic. The students will complete the laboratory in teams of two. There will be 15 lectures and 10-12 laboratories.

Content:

The lectures will consist of 11 major units. The content for each unit is summarized below.

I. OVERVIEW OF MICROCOMPUTER APPLICATIONS IN THE SPEECH AND HEARING CLINIC.

This section will provide the rationale and goals for the course. Each section is designed to introduce the area and not teach it as a terminal skill.

II. INTRODUCTION TO THE MICROCOMPUTER EQUIPMENT.

This section will cover the main hardware components of the microcomputer system. The focus will be on the function of each component (e.g. disk drive feeds programs into the computer and stores data from the computer) rather then on the electronic processes involved with each component.

III. MAINTAINING CLIENT RECORDS

This section will delineate the three primary purposes that the microcomputer serves in maintaining client records. It will include a discussion of: 1) How it allows for a complete statistical analysis of the client files data base, (this may have a significant effect on future planning); 2) How it may also be helpful in developing data necessary for grant funds; and 3) How it serves as an efficient information storage system (e.g. one microcomputer storage disk can hold 200-500 client files).

IV. MAINTAINING CLIENT SCHEDULES

This section will focus on the value of using microcomputers in maintaining client schedules and attendance records. The two major benefits to be discussed are: 1) How the microcomputer facilitates easier scheduling for large numbers of clients; and 2) How it helps the clinic to produce information on the total number of contact hours, contact hours for respective clinicians, and contact hours for respective pathologies.

V. MAINTAINING THERAPY DATA

This section will cover the significance of using the microcomputer as a mechanism for maintaining client therapy data. Specifically, it will address: 1) How it can be used to perform an experimental analysis of therapy data, and 2) How it can be used to compare treatment program effectiveness.

VI. INTRODUCTION TO MICROCOMPUTER PROGRAMMING

This section will describe various types of software modifications that can be made to meet individual client needs (e.g. slowing down the rate for handicapped students; creating clearer instructions, etc.)

VII. WORD PROCESSING

This section will specify how word processing allows the clinician to compose written material, easily make changes at a later time, and print out that written material.

VIII. ASSESSMENT

Rationale:

There are few estimates on the number of language assessment given to communicatively handicapped individuals in the country. But some surveys would indicate that the total number must run into the tens of thousands every year. This is a great drain on clinician time that could be spent in other areas. In many cases, the individual may be able to take a computer-assisted language comprehension examination. The microcomputer can also analyze and store the test results. Specifically, microcomputer assessments will: 1) save clinician time, 2) present the assessment in a consistent manner, 3) score the assessment, and 4) analyze the results.

9) THERAPY

Rationale:

There are many therapeutic procedures that can be replicated to a certain degree by the microcomputer. It may be possible for many communicatively impaired individuals to take at least some of their therapy through the microcomputer. The system is able to store the therapy data so that the clinician can always tell how well the individual is doing. Microcomputer based therapy will open up on unexplored new mode of treatment for the communicatively impaired. Specifically, 1) it may help accomplish the habilitation of a client faster since the clinician always has a finite amount of direct contact hours available, 2) by allowing certain individuals to receive some therapy on the microcomputer, the clinician can devote more direct contact time to the more difficult and complex cases, and 3) it may help those communicatively impaired individuals who do not have a clinical treatment program nearby.

X. NON-VOCAL COMMUNICATION

This section will cover how the microcomputer can be used as a comprehensive living aid for some non-vocal, severely physically handicapped individuals. It will specifically delineate: 1) How it can be used as a speech-output, customized vocabulary communication aid, 2) How it can be used as a writing tool with total editing and printing capabilities, 3) How it can be used as a tool for academic instruction, 4) How it can be used to produce art and music compositions, 5) How it can be used as a device for leisure and recreation, and 6) How it can be used as a record keeping device.

XI. DATA ANALYSIS; STATISTICS; RESEARCH

This section will delineate the research capabilities of the microcomputer. It will focus on: 1) How practicing clinicians who may wish to conduct research at their facility may do so with a microcomputer equipped with statistical software, 2) How this will allow the clinician to perform experimental and descriptive research, and 3) How the clinician can perform statistical analyses immediately and therefore can have the required information at any time.

APPENDIX B

PRE/POST TEST

ORAL INSTRUCTIONS GIVEN BEFORE PRE-TEST

1. This course is Clinical Microcomputer Applications, SPC 5905

2. All questions regarding registration and course requirements will be answered later.

3. Due to the experimental nature of this course, all participants are required to fill out a background information document.

4. There are two parts to this document. After you finish part I, raise your hand and I will give you the second part.

5. Should you finish both parts before the rest of the class, you may go outside until the rest of the class is finished or 30 minutes is up: whichever comes first.

6. I can not answer any questions about this background document. Just fill it out to the best of your ability.

7. The class lecture will begin when the whole class finishes filling out this document or 30 minutes is up, whichever comes first.

SPC 5905
Clinical Microcomputer Applications

Name:
Classification:
Major:
Undergraduate degree in:
Sex:
Have you taken other college course(s) devoted solely to computers:

If yes, please describe:

Part I

1) THE MICROCOMPUTER CAN BE OF SERVICE TO YOU AS A SPEECH-LANGUAGE OR HEARING CLINICIAN. LIST AS MANY REASONS AS YOU CAN.

Part II

2) LIST THE FOUR MAJOR HARDWARE COMPONENTS OF A MICROCOMPUTER SYSTEM.

3) DESCRIBE THREE WAYS IN WHICH PUTTING CLIENT RECORDS ON THE MICROCOMPUTER HELP YOUR SERVICES.

4) DESCRIBE TWO WAYS IN WHICH KEEPING THE CLINIC THERAPY SCHEDULE ON THE MICROCOMPUTER HELP YOUR SERVICES.

5) DESCRIBE THREE WAYS IN WHICH KEEPING THERAPY DATA ON THE MICROCOMPUTER HELP YOUR SERVICES.

6) HOW WILL HAVING SOME FUNDAMENTAL PROGRAMMING SKILLS HELP THE CLINICIAN?

7) What do each of the following BASIC computer language statements do?

A) PRINT

B) GOTO

C) INPUT

D) GOSUB

E) IF...THEN

8) WHAT IS WORD PROCESSING (OR TEXT EDITING)?

9) DESCRIBE FIVE WAYS IN WHICH WORD PROCESSING (OR TEXT EDITING) HELP YOU WITH MATERIAL THAT MUST BE TYPED.

10) DESCRIBE FOUR WAYS IN HOW IT IS HELPFUL OR ADVANTAGEOUS TO THE CLINICIAN AND/OR THE CLIENT TO HAVE MICROCOMPUTER ADMINISTERED LANGUAGE ASSESSMENT TESTS?

11) DESCRIBE THREE WAYS IN HOW IT IS HELPFUL OF ADVANTAGEOUS TO THE CLINICIAN OR CLIENT TO HAVE THE MICROCOMPUTER ADMINISTER CERTAIN THERAPY PROGRAMS?

12) DESCRIBE SIX WAYS IN WHICH THE MICROCOMPUTER CAN HELP A NON-VOCAL, SEVERELY PHYSICALLY HANDICAPPED CHILD OR ADULT?

13) HOW WILL THE MICROCOMPUTERS STATISTICAL ANALYSIS CAPABILITIES HELP THE CLINICIAN?

PRE-POST TEST ANSWERS

#1)

1) Maintaining client records
2) Maintaining client schedules
3) Maintaining therapy data
4) Word Processing
5) Performing Assessments
6) Performing Therapy
7) Aid for Non-Vocal
8) Data analysis and Statistical Methods.

#2)

1) Computer (CPU; Keyboard)
The instructions of a program are carried out here. All analysis are carried out in the computer. The user communicates with the computer through the keyboard.
2) Disk Drive (Floppy Disks)
The computer program and any data are stored on floppy disks through the disk drive. Then can then be fed back into the computer through the disk drive.
3) Monitor
The monitor is a television set or CRT that allows the user to interact with the particular program.
4) Printer
The printer produces hard copy of any program or data. It can produce graphs, charts, and pictures.

#3)

1) It allows for a complete statistical analysis of the client files data base. This may have a significant effect in the speech clinics planning for future needs;
2) It may also be helpful in developing data necessary for grant funds; and
3) It reduces paper storage significantly. One microcomputer storage disk can hold 200-500 client files.

#4)

1) the microcomputer allows easier scheduling for large numbers of clients; and
2) it allows the clinic to produce information on the total number of contact hours, contact hours for respective clinicians, and contact hours for respective pathologies.

#5)

1) allow an experimental analysis of therapy data,
2) provide for comparative information on results of similar clients; and
3) compare the results of similar or varying types of therapy

#6)

Minimal programming expertise allows the clinician to modify certain programs to fit the particular needs of a client. For example if the client is very young, the program instructions can be re-written to be more understandable.

#7)

1) PRINT
   This command controls what is seen on the monitor.
2) INPUT
   This command means the computer will wait and read a response from the user.
3) IF...THEN
   Allows the computer to make choices (e.g. if the user says 'yes' continue on, if he says 'no', stop the program.
4) GOTO
   Controls the flow (direction) of the program. (e.g. if he made less than 10 responses, goto the beginning again.)
5) GOSUB
   Allows one section of a program to be used many times. (e.g. every time he gets an answer correct...gosub to the section that says "That's Right!".

#8)

Word processing allows the clinician to compose written material, easily make changes at a later time, and can store large amounts of written material on small, floppy disks.

#9)

1) Correct spelling
2) Delete or add a word
3) Rearrange sentences
4) Rearrange paragraphs
5) Add sections of other reports into the report being written

#10)

Microcomputer assessments will:
1) save clinician time,
2) present the assessment in a consistent manner,
3) score the assessment, and
4) analyze the results.

#11)

1) It may help accomplish the habilitation of a client faster since the clinician always has a finite amount of direct contact hours available,
2) By allowing certain individuals to receive some therapy on the microcomputer, the clinician can devote more direct contact time to the more difficult and complex cases, and
3) It may help those communicatively impaired individuals who do not have a clinical treatment program nearby.

#12)

It can serve:
A) as a speech-output, customized vocabulary communication aid,

B) as a writing tool that allows total editing and printing capabilities,
C) as a device to help the individual learn a number of academic subjects,
D) as a device that allows art and music production,
E) as a device that can be used for leisure and recreation, and

F) as a record keeping device.

#13)

This will allow the clinician to perform experimental and descriptive research without having the computer data analysis done elsewhere. Statistical microcomputer programs are now user-oriented. This will benefit the clinician in that she can perform statistical analyses immediately and therefore can have the required information at any time. There is a good expectation that this will generate new research from non-university clinics.

APPENDIX C

QUESTIONNAIRE 1

Key:

1 Strongly Disagree
2 Disagree
3 Agree
4 Strongly Agree

(5 Could Not Judge)
(6 Does Not Apply)

1. The rationale for the course was clearly presented and supported.

1 2 3 4 / 5 6

2. The objectives for the course were met for the length of time available.

1 2 3 4 / 5 6

3. I clearly understand the clinical significance of the material presented.

1 2 3 4 / 5 6

4. I feel the material presented in this course will increase my opportunities for employment in a clinical position.

1 2 3 4 / 5 6

5. The breadth of material presented in this course should have a significant effect on my clinical skills.

1 2 3 4 / 5 6

6. I feel that this course should be offered in a graduate curriculum for Speech-Language Pathologists.

1 2 3 4 / 5 6

APPENDIX D

QUESTIONNAIRE 2

COURSE EVALUATION MEASURE

Use agreement scales:

1 Strongly Disagree
2 Disagree
3 Agree
4 Strongly Agree

5 cannot judge (I just can't decide how I feel.)
6 does not apply (I was absent that day; etc.)

For each area, 1-10,

A) The rationale for why each unit of the course as listed below is an important and worthwhile microcomputer application for speech pathologists was explained adequately.

1) Overview of microcomputer applications in the Speech and Hearing Clinic. 1 2 3 4 / 5 6
2) Introduction to the microcomputer equipment 1 2 3 4 / 5 6
3) Word processing 1 2 3 4 / 5 6
4) An aid for Non-Vocal, Severely Physically Handicapped 1 2 3 4 / 5 6
5) Data analysis; Statistics 1 2 3 4 / 5 6
6) Introduction to microcomputer programming 1 2 3 4 / 5 6
7) Maintaining client records 1 2 3 4 / 5 6
8) Maintaining therapy data 1 2 3 4 / 5 6
9) Maintaining client schedules 1 2 3 4 / 5 6
10) Assessment 1 2 3 4 / 5 6
11) Therapy 1 2 3 4 / 5 6

B) The laboratory section for each unit of the course adequately supported the lecture unit:

1) Overview of microcomputer applications in the Speech and Hearing Clinic. (Lemonade Stand) 1 2 3 4 / 5 6
2) Introduction to the microcomputer equipment (Apple Pilot/Legends; Guess The Number; Guess The Number:Spoken) 1 2 3 4 / 5 6
3) Word processing (Applewriter) 1 2 3 4 / 5 6
4) An aid for non-vocal, severely physically handicapped (TALK II) 1 2 3 4 / 5 6
5) Data Analysis; Statistics (Mean; t-Test) 1 2 3 4 / 5 6
6) Introduction to microcomputer programming (Guess The Number) 1 2 3 4 / 5 6
7) Maintaining client records (File Cabinet) 1 2 3 4 / 5 6
8) Maintaining therapy data (Therapy Data Collector) 1 2 3 4 / 5 6
9) Maintaining client schedules (No Lab)
10) Assessment (Carrow Automated Test Model) 1 2 3 4 / 5 6
11) Therapy (/s/ Meter; Sentence Structure) 1 2 3 4 / 5 6

D) Answer these questions using the answer key above.

1) The course mode (lecture and lab) was adequate.
1 2 3 4 / 5 6

2) The organization of the course was adequate.
1 2 3 4 / 5 6

3) The length of the course was long enough for the stated objectives.
1 2 3 4 / 5 6

4) The course objectives were adequate.
1 2 3 4 / 5 6

5) For my purposes, microcomputers still confuse me.
1 2 3 4 / 5 6

6) Microcomputers are easy enough for me to learn to use for clinical purposes.
1 2 3 4 / 5 6

7) I don't care to read about microcomputer applications in Speech and Hearing.
1 2 3 4 / 5 6

8) I would like to know more about microcomputer applications in Speech and Hearing.
1 2 3 4 / 5 6

9) As a Speech and Hearing Clinician, I would ask to utilize a microcomputer if I were employed at this time.
1 2 3 4 / 5 6

10) I think all Speech and Hearing Clinicians in academic training programs should be taught the use of the microcomputer.
1 2 3 4 / 5 6

11) Now that I have had this course, I will probably learn more about microcomputers in Speech-Language and Hearing training on my own.

1 2 3 4 / 5 6

12) After taking this course I feel qualified to provide a strong rationale for the use of a microcomputer as a clinical tool in a Rehabilitation center with a wide range of communicatively handicapped individuals?

1 2 3 4 / 5 6

13) After taking this course I feel qualified to provide a strong rationale for the use of a microcomputer as an administrative tool in a Speech and Hearing facility?

1 2 3 4 / 5 6

D) For the 11 course units listed below, please indicate if they were given too little emphasis, too much, or the right amount (for the stated purposes of the course).

1) Too little emphasis
2) Adequate emphasis
3) Too much emphasis

4) Could not judge (I just don't know how I feel.)
5) Does not apply (I was absent that day; etc.)

1) Overview of microcomputer applications in the Speech and Hearing Clinic. 1 2 3 / 4 5
2) Introduction to the microcomputer equipment 1 2 3 / 4 5
3) Word processing 1 2 3 / 4 5
4) An aid for non-vocal, severely physically handicapped 1 2 3 / 4 5
5) Data Analysis; Statistics 1 2 3 / 4 5
6) Introduction to microcomputer programming 1 2 3 / 4 5
7) Maintaining client records 1 2 3 / 4 5
8) Maintaining therapy data 1 2 3 / 4 5
9) Maintaining client schedules 1 2 3 / 4 5
10) Assessment 1 2 3 / 4 5
11) Therapy 1 2 3 / 4 5

E) Briefly answer the following questions.

1) What were the most positive aspects of the course?

2) What were the most negative aspects of the course?

3) What improvements would you recommend for future classes?

4) What area(s) of course content did you find most pertinent to your expected future employment(s)?

APPENDIX E

GLOSSARY

Digitized Speech - A computer peripheral which codes an individual's speech, stores the code on a diskette to be used as speech-output for programs.

Diskette - A mass memory storage medium for the microcomputer.

Light Pen - A pen-shaped input perhipheral for the computer. It allows the user to respond to a program by touching the light pen to the screen of the monitor.

Speech Recongnition - A computer peripheral device which analyzes sound and responds according to programming.

Synthesized Speech - Complex electronic sound patterns designed to sound like speech.

APPENDIX F

LABORATORY SOFTWARE

1	Lemonade Stand Kellner, C. (c) 1979, Apple Computer Inc.
2	ApplePilot (c) 1979, Apple Computer Co.
	Guess the Number (Public Domain)
3	File Cabinet (c) 1979, Apple Computer Inc.
4	no laboratory
5	Therapy Data Collector Rushakoff, G. and Toossi, M. (c) 1981
6	Guess the Number (Public Domain)
7	Applewriter (c) 1979, Apple Computer Inc.
8	Automated Testing Model Rushakoff, G. and Johnson, A. 1981, University of Florida
9	TALK II Rushakoff, G., Condon, J., and Lee, R. (c) 1981
10	Statistics Package (Public Domain)
11	The /s/ Meter Rushakoff, G. and Edwards, Wm. (c) 1981
	Sentence Structure Stuart, H. and Woolley, R. (c) 1979, Utah State University

APPENDIX G

STUDENT COMMENTS

Student Responses to Questionnaire

	MEAN	S.D.
1) The organization of the course was adequate.	3.92	.29
2) The length of the course was long enough for the stated objectives.	3.83	.39
3) I would like to know more about microcomputer applications in Speech and Hearing.	3.81	.40
4) The course mode (lecture and lab) was adequate.	3.75	.45
5) The course objectives were adequate.	3.75	.30
6) After taking this course I feel qualified to provide a strong rationale for the use of a microcomputer as an administrative tool in a Speech and Hearing facility?	3.67	.49
7) Now that I have had this course, I will probably learn more about microcomputers in Speech-Language and Hearing training on my own.	3.64	.67

8) As a Speech and Hearing Clinician, I would ask to utilize a microcomputer if I were employed at this time.	3.60	.52
9) Microcomputers are easy enough for me to learn to use for clinical purposes.	3.58	.51
10) I think all Speech and Hearing Clinicians in academic training programs should be taught the use of the microcomputer.	3.58	.51
11) After taking this course I feel qualified to provide a strong rationale for the use of a microcomputer as a clinical tool in a Rehabilitation center with a wide range of communicatively handicapped individuals?	3.58	.51
12) For my purposes, microcomputers still confuse me.	1.75	.62
13) I don't care to read about microcomputer applications in Speech and Hearing.	1.18	.40

APPENDIX H

MAIL SURVEY DATA

1. Does your department and/or Speech and Hearing Clinic have a microcomputer?

Yes 24 No 34

If yes, (how many)

(Categories are not mutually exclusive)

13	54.17%	Apple][
6	20.83%	TRS-80
		Atari
		OSI
		Commadore PET
		IBM (Personal Microcomputer)
12	50.00%	Other

2. If not, does your department and/or Speech and Hearing Clinic have plans to get one or more?

Yes No 21 No Response 1

If you don't have one please indicate the reason(s) below:

2	Have not considered purchasing one
7	Have considered purchasing, but has not been given high priority
5	Have considered purchasing, but no staff to teach its utilization
15	Would purchase if funding was available
5	Other (please explain)

3. If you have a microcomputer or are planning to get one, please rank order the top three applications for which you have been/will be using your microcomputer over the next two (2) years?

1	2	3	
-	-	-	
6	3	3	Word Processing
4	2	1	Student Clock hours
		1	Student Grades
1	1	3	Departmental Budget Accounts
4	7	4	Clinic Client Records
	1	3	Clinic Schedules
			Teaching Computer Programming to Students
2	3	3	Instructional Courses for Students
2	5	7	Statistical Analysis
2			Provide Therapy
1		1	Administer Clinic Assessments
			For Physically Handicapped Clients
1	2	1	Maintaining Client Therapy Data
			Others - Please explain:
6	2		Research
	1		ABR Testing

4. If you have a microcomputer, has your department: (24 responses)

13	Already developed speech and hearing related software
19	In the process of developing speech and hearing related software
3	Have not developed any software
	Other (please explain)

5. Does your Speech and Hearing Department offer an academic and/or laboratory course for credit on microcomputer applications for Speech-Language and Hearing Clinicians?

Yes 7 No 45

6. If not, are you currently planning to offer such a course within the next two (2) years.

Yes 3 No 40

APPENDIX I

COURSE LABORATORIES

Name:
Partners Name:

Clinical Microcomputer Applications
SPC 5905
Rushakoff

Laboratory #1

---> Before the lab:

1. Get a laboratory partner
2. Go to room ASB 458 and find the MICROCOMPUTER SCHEDULE posted on the wall by the window. Find a 1 hour block of time that is free between 8:00 - 5:00, Monday through Friday.
3. Put BOTH initials (you and partner) in that time block. (Remember, on the schedule, each block is 1/2 hour, so initial 2 of the blocks.)

---> Performing the lab:

Answer all questions. This lab report is due in class on Monday.

4. Open center drawer of Lab table and find the diskette marked #1.

5. Open door flap of disk drive #1.

6. Check to make sure there is no diskette in the drive. If there is, take it out and put it in the center drawer.

7. Put diskette #1 in the disk drive marked #1. When putting the diskette in the drive, the label with the #1 on it should be facing up and to the right of your thumb.

8. Close the disk drive door flap.

9. Find the main power strip on the back right hand side of the table.

10. Turn on the power.

11. In a few moments the screen will look like this:

```
A  002  HELLO
A  047  LEMONADE STAND
```

12. You are looking at the catalog of all the programs on this diskette. The letter on the left indicates what computer language the program is written in.

```
A --> Applesoft (BASIC)
I --> Integer (BASIC)
B --> Machine Language
```

? 13. What language is LEMONADE STAND written in ?

14. The three numbers that follow indicate how many 'sectors' the program takes up on the diskette. For our purposes, it just gives us a rough indication of how large the program is.

? 15. How many sectors does LEMONADE STAND take ?

16. To run LEMONADE STAND, type

```
RUN LEMONADE STAND
```

then press the RETURN key

(Make sure you type the name of the program exactly as it appears in the diskette catalog.)

17. The first question the program asks is, 'Is this a new game?' Type YES and then press the RETURN key.

18. It then asks how many people are playing. Since there are two of you type 2 and hit RETURN. (From now on you must always remember to press RETURN after typing something.)

19. Read the directions carefully.
(When it says to press SPACE to continue, that means the space bar.)

? 20. For Day 1 fill in the following information.

How many glasses are you making for DAY 1?.....

How many signs for DAY 1?.....

How much are you charging per glass.....

? 21. What was your profit for DAY 1?.....

22. Continue using this program until DAY 10 or until your time is up. If you reach DAY 10 and you have time left, you may continue if you wish until your time is up. To end this program, after your 'Financial Report' press the ESC key.

? 23. What was your final profit?.....
(Be honest!)

? 24. Besides 'entertainment' do you see any other purpose behind this program? What?

25. --> When you are finished: <--

1) Take out diskette and put it in the drawer.
2) Turn off ONLY the main power switch on the power strip. (Do not turn off the TV or the power switch on the computer.)

Name:
Partners Name:

Clinical Microcomputer Applications
SPC 5905
Rushakoff

Laboratory #2

In this laboratory you will be utilizing three programs.

1) Apple Pilot
2) Guess the Number
3) Guess the Number:Spoken

Answer all questions. This lab is due in class on Monday.

Part I
---

1. Find two diskettes in the drawer.
   CLINICAL MICROCOMPUTER APPLICATIONS Diskette #1
   CLINICAL MICROCOMPUTER APPLICATIONS Diskette #2

2. Put diskette #2 in disk drive #1. Close disk drive flap.

3. Turn on the main power switch.

4. You are looking at the main menu page of the demonstration diskette of Apple Pilot.

5. Pilot is a program used to create computer lessons in any subject without having any programming experience. You will be going through a sample (demonstration) lesson.

6. Read the page on the screen. When it asks what program you wish to see, type Legends.

7. It will soon ask for your name. Just give it one name.

8. You will note that this program uses a lot of graphics (drawings).

9. When the lesson is running try answering many of the questions wrong. See what happens.

?? 10. While the lesson is running, you may answer the following questions for this lab report.

A) Does this lesson use color graphics?
B) Does this lesson use sound effects?
C) Why do people like LAF Birds?
E) When the lesson was over, did it give you a data readout of how well you did?

Part II
---

1. Put diskette #1 in disk drive #1.

2. Press the RESET key. In a few moments you should see the catalog of this diskette. If you don't get it, turn off the power switch and then back on again.

3. You should now see the catalog of this diskette.

```
 A  002  HELLO
 A  048  LEMONADE STAND
 A  004  GUESS THE NUMBER
 A  006  GUESS THE NUMBER:SPOKEN
*B  036  TALK
```

? 4. What language is GUESS THE NUMBER written in?

How about TALK?

Key:
A...Applesoft (BASIC)
I...Integer (BASIC)
B...Machine Language

? 5. How many sectors is GUESS THE NUMBER?

6. Run GUESS THE NUMBER and go through it only once or twice. (In case you forgot: type RUN GUESS THE NUMBER)

7. When the program is over run GUESS THE NUMBER:SPOKEN

? 8. With what type of children would the second version be useful ?

? 9. What was your opinion of the intelligibility of the voice ?

? 10. From the list of microcomputer applications discussed in the first lecture, which (don't say all) could benefit or utilize speech output? Why? (Be brief.)

Laboratory #3
Clinical Microcomputer Laboratory
Word Processing

Name:
Partners Name:

1. Take out diskette marked Clinical Microcomputer Applications #3.

2. Put it in drive #1 and turn on the power.

3. You are looking at the Editor Menu of Applewriter, a word processing program.

4. On this menu you are given six choices of things to do:

   <E> -> This allows you to create and work on written material in the microcomputers memory.

   <N> -> You use this command when you wish to start a brand new piece of written material.

   <L> -> If you already have some written material started and stored on the diskette, this allows you to put it into the microcomputer so you can work on it somemore.

   <S> -> When you want to save written material to be worked on another time.

   <P> -> Prints out written material.

?? 5. For this lab, we need to LOAD some written material stored on the disk. What letter do you press ?

6. Press the letter you indicated in question #5. The program will ask for the file name. Type TUTORIAL and press return. You should hear the disk drive begin to load the written material. (If the program says FILE NOT FOUND, you typed the name TUTORIAL incorrectly. Press L again and return, then press return again and retype TUTORIAL.)

7. When the disk drive stops making noise,
press E and then return.

8. Read and follow the directions of what appears on the screen. Should you ever get a blank white cursor and can't continue...press the ESC key twice and the M key to go on.

Answer all Questions:

?? 9. What key allows the cursor to move down the page?

?? 10. Which cursor allows you to enter text?

Which capitalizes? (Upper Case)

Which allows you to move the cursor around the screen?

?? 11. Which four keys allow you to move the + cursor around the screen?

?? 12. How can you tell that a letter is capitalized (appears in Upper case).

13. Turn off power, place diskette in drawer.

Clinical Microcomputer Applications
Rushakoff
Laboratory #4
Word Processing

Name:
Partner:

1. Take out Clinical Microcomputer Laboratory Diskette #3. Put in disk drive. Turn on power.

2. You are looking at the Editor Menu page of Applewriter. Press N (and return) to indicate that you wish to start a brand new piece of material. The program will now warn you that it will erase any other written material in the microcomputer. Press Y (return.)

3. You are looking at a blank screen with the flashing cursor at the top left. This is the 'work area' for Applewriter.

4. ALL of the following word processing exercises must be completed by each student. When one lab partner finishes an exercise, the other partner must complete the same exercise.

Exercise #1: ("Letter from School")

5. Press the return key twice to move the cursor down two lines.

6. Type: (Hint-remember to capitalize.)

Dear Maw and Paw,

7. Then press the return key three times to move the cursor down two lines.

8. Type: (Hint-you must only press the return key at the end of a paragraph. You may be tempted to press the return key when the cursor reaches the edge of the screen. Don't)

I am taking this extremely neat class on using microcomputers in my job. I soon hope to figure out what my job actually is. I fully expect to graduate during the 80's.

9. Press the return key three times to start a new paragraph.

10. Type:

Just to show you how well I am doing in this here school, I will enclose in this letter a note from my microcomputer instructor.

11. To add my note to your letter, Press Control-I. (If nothing happens, press them again.) The program will ask for the name of the file you wish to insert. Type: note from instructor

12. Sign you letter. (You know...Great love from....etc.)

13. Find the part of your letter where it says that you are in an "extremely neat class." Delete "extremely" and instead type in "neat".

14. Now check for any spelling errors.

15. Then press the ESC key twice then control-Q. You should be looking the Editor Menu. First let's save your material to the disk. Type S and return. It will ask you for a file name. Type your last name and then "LETTER" (i.e. SMITH LETTER) You will hear the disk drive whirr. Your file is being written on the diskette.

16. When both partners have finished exercise #1. You will now print out your letter.

17. Press L to load your file from the diskette. It will ask for the name of your file. Type it exactly as you did to save it. When the disk drive finishes whirring press E to take a look at your material. Everything there and O.K.? Now press ESC,ESC, Control-Q to get to the Editor Menu.

18. Press P to get to the Printer Menu. Press P again. You are now looking at the printing variables. For example do you want it single spaced, double spaced? How far in do you want your left margin and right margin? Do you want all you pages numbered? etc. All of these variables have been preset for your exercise. Do not change anything.

19. Press the return key. The program will ask if it should print a heading. Just press the return key, then press the return key again to start printing.

20. When once letter has been printed out you will be back at the Printer Menu. Press L to load the partners letter. Then follow the instructions from #18.

Exercise #2 (Bibliography)

1. From the Printer Menu, Press R to get back to the Editor Menu.

2. Press L and load BIBLIOGRAPHY.

3. Press E.

4. Your job is to alphabetize these four citations without actually typing anything.

5. All you need to use is the left arrow <- to delete...The + cursor to travel....and the right arrow -> to retrieve the material.

6. Then print it out just as above.

7. Repeat from #2 for lab partner.

8. Your laboratory points will be based on:

   A) your letter from school on the diskette
   B) your printed out copy of letter from school.
   C) your printed out copy of the bibliography.

Clinical Microcomputer Applications
Rushakoff
Laboratory #5
Microcomputer Applications for Non-Vocal, Severely Physically Handicapped Individuals

Name:

Partners Name:

1. Take out diskette marked Clinical Microcomputer Applications #4. Put in drive #1, and turn power on.

2. This is TALK][.

3. You are now looking at the screen which has several options or choices. In all programs, this is called the Menu.

4. Just press T to run TALK][. It only takes about 8-10 to load the program, but it takes about 90 seconds to load all the vocabulary and sounds to speak that vocabulary into the computer.

5. The program will beep when it is finished loading. You are looking at page one of the word pages.

6. Press Y to hear "Yes" and N for "No".

?? 7. The Space Bar goes to the 'next page.' Press it to see the vocabulary on all of the pages. How many word pages are there?

8. You can also go to any particular page you want. To get to pages 1-9 press that number on the top of the keyboard. For example, press 4 to go to page 4. To go to pages above page 9, first press F. It asks you what page you want to go to. Enter 15 and press return.

9. That's how you change pages. To speak words, press A to get the alphabet on the screen (get it...A for alphabet!)

10. You may choose each word, phrase, sound or letter, by just pressing the keyboard letter or punctuation mark next to it on the screen.

?? 11. Try it. Where on the screen does the item you selected appear?

12. Put together a sentence. If you make an error press the left arrow <- to delete the last entry. When you finished putting together the sentence, press T to make the computer talk (get it...T for Talk!)

13. You may delete your sentence using the left arrow.

14. Now press the return key. The keyboard alphabet should disappear from the screen. Press G. This is known as a 'grabber,' a message that you can 'speak' immediately without having to construct it. Press H and J to hear other 'grabbers.'

15. Now press S to get to the sentences (get it....S for sentences!)

16. You are looking at page 1 of sentences. Press the space bar to look at all the sentence pages or press a number to go to a particular sentence page.

17. Find a sentence you would like to speak and press the letter next it. Try saying some of the sentences. What's your favorite?

18. Now press return to get back to the word pages.

19. For this laboratory each partner will have to create a one sentence message, print it, and save it in TALK][.

20. After doing #18 you are now on the word pages again. Press A to get alphabet. Create a sentence as you did before.

21. When done press T to make sure it's all right. Now press return to get rid of the alphabet. Press D to print out your message.

22. When that's done, leave your message alone. Press S to get back to the sentences. Find a page that has a blank slot. Press I to Insert your sentence into the sentence pages. After you press I the program will ask which letter you wish to store your sentence at. Press that letter. Wait a moment.

23. Press return to get back to word pages. Repeat # 20-22 for each lab partner.

24. When the last message has been created, printed and saved press return. You will be back on the word pages. Press the ESC key to end TALK][. It will ask if you are really sure you wish to quit. Respond Y. It will then ask you if you wish to Save. Since you created new messages in the program, they must be re-saved back to the disk. Respond Y. Wait till the disk drive stops whirring. Put back in drawer.

25. For this lab your grade will be based on:

A) The questions on this lab sheet
B) The printed out message that you will turn in.
C) The 'saved' message on the diskette that corresponds to the printed out message you turned in.

Clinical Microcomputer Applications
Rushakoff
Laboratory #6
Statistics

Name:

Partners Name:

(Use Clinical Microcomputer Applications Diskette #1.)

1. You have given the Peabody Picture Vocabulary Test (PPVT) to 13 of your clients. Six are hearing impaired and seven have normal hearing. They are all matched for age and other variables. You are trying to find out if hearing impairment is a factor in interpreting the PPVT. For the first part of your research you need to know the mean and standard deviation of each group.

2. Here are all the raw scores you have:

Hearing Impaired (N=6)
64, 64, 77, 77, 89, 120

Normal Hearing (N=7)
93, 93, 108, 108, 128, 130, 142

3. Run the program MEAN. You must run each group (hearing impaired and normal hearing) separately. The program first wants to know how many different scores there are in group #1 (hearing impaired). (Not the total number of scores (6), since duplicate scores count as one.) So enter in the total number of 'different' scores (for the hearing impaired group there are four (4) different scores.) It now asks for score #1 followed by how many times that score occurred. So if score #1 occurred only once, type 88,1 if score #1 occurred twice then type 88,2 etc.

Do this procedure for both groups.

4. What was the mean PPVT raw score and standard deviation of: (Round off so there are no decimal places.)

Hearing Impaired (Group #1) Mean-
S.D.-

Normal Hearing (Group #2) Mean-
S.D.-

5. Now you want to know how far above or below the mean a few of the hearing impaired children were. You already know what the mean and S.D. of the hearing impaired group is. Now run the program called NORMAL DISTRIBUTION. The first thing it wants to know is what the mean of the group was (as before, you can round-off). After you press return it wants to know what the standard deviation was. Enter that in. Now we want to find out each hearing impaired childs standard deviation from his group. So, enter one score when asked and press return. Write down the answer on the chart provided on the next page and be sure to include a (-) negative if the S.D. was below 1.0 (Only write down up to two decimal places, e.g. if the answer is 0.144378 just write down 0.14)

Subject	SCORE	Standard Deviation
#1	64----	
#2	64----	
#3	77----	
#4	77----	
#5	89----	
#6	120----	

6. You have given the Peabody Picture Vocabulary Test to thirteen of your clients. They are all 5 years old. Six of them are hearing impaired and seven have normal hearing. You want to find out if hearing impairment is a factor in interpreting Peabody scores. A t-test will tell you if there is a significant difference in the mean raw scores of the two groups.

7. Run T-TEST

8. Run the scores given in #2. When done the program will give you a t value and degrees of freedom. For this exercise we will use the 0.05 level of significance. Check the t-table taped to the wall in front of you. First find the appropriate 'degrees of freedom' row. Then find the 0.05 column. Where the row (degrees of freedom) and the column (level of sig.) intersect there is a number. If the t-value the program gave you is greater than the number in the table than the scores of the two groups are significantly different. If the t value is smaller than the number in the table the scores of the two groups are not significantly different.

9. Were the PPVT scores of the two groups (hearing impaired & normal hearing) significantly different?

10. Why may it benefit the clinician, client, and other communicatively impaired individuals if the clinician has microcomputer based statistics packages at the clinic or school?

11. Your points for this lab will be based on the numbers entered on this lab sheet and any other questions asked.

Clinical Microcomputer Applications
Rushakoff
Laboratory #7
Introduction to Programming

Name:
Partners Name:

1. Attached is a copy of the program for Guess the Number, which you used in a previous laboratory. Take a look at it.

2. All the program statements are numbered because (unless otherwise instructed) the computer follows the program instructions in numerical order.

3. All through this program listing you will see statements called REM. This stands for Remarks. They tell you what is going on in a particular part of a program. It's sort of like if there were labels on each device under the hood of your car. The label told what each device did for the operation of the car. Well, that's what REM's are for. They are sort of like comments.

4. There are two parts to this laboratory. For one, all you need is this program listing. For the other you will need Clinical Microcomputer Applications Diskette #1.

Section #1

5. There are basically seven sections to this game. For each of the seven sections, look at the program listing and write down the line number which begins each section of the game listed below.

1) TITLE PAGE -
2) GAME BEGINS -
3) IS IT RIGHT -
4) IF TOO HIGH -
5) IF TOO LOW -
6) IF CORRECT -
7) WANT TO PLAY AGAIN? -

6. Now go to the program listing and write down which section is at that first line number of each section. For instance at the line number which begins the Title Page, write SECTION 1, etc. for all seven sections.

Section II

7. This section must be completed by each lab partner.

8. Put your program listing on the lab table and also put Clinical Micro Diskette #1 in drive and turn power on.

9. This time, I took out the auto-catalog feature. All you see is a bracket and flashing cursor. Type CATALOG. Now you should see it.

10. Run the program GUESS THE NUMBER and play it at once to refresh your memory about it. Do you see the seven sections delineated above?

11. After you've run it, you should have the bracket and flashing cursor back again. To see the Guess the Number program in the computer, type LIST.

12. Kind of hard to see it, No?

13. This time, after you type LIST, use the Control key and the S key (CTRL-S) to stop and start the program listing. Remember to use CTRL like a shift key.

14. The program is still in the computer. You will now change a few of the lines to make it look different.

15. On your program listing sheet, line 270 is part of the title page.

    Type 270 PRINT "YOUR NAME"

    and then hit the return key.

16. So now, instead of The University of Florida, it will show your name.

17. Let's add a bit more to the beginning of the game.

Type 541 PRINT "LIKE WOW MAN"

(Hit return after each line entry.)

```
542 PRINT "LET'S PLAY THIS"
543 FLASH
544 PRINT "FAR OUT"
545 NORMAL
546 PRINT "GAME"
547 FOR PAUSE = 1 TO 600:NEXT PAUSE
```

18. Now type run to see how your changes affected the program. If the program stops with a syntax error, it will tell you the line number where the problem is. Type LIST and then the line number and then return. You will see the line you typed in. Find out what was wrong and retype the line. Type RUN to see if it works.

19. Type

```
550 PRINT "LIKE WOW MAN"
551 PRINT "I'M ...LIKE.. THINKING OF A NUMBER"
552 PRINT "FROM 1 TO SORT OF ...LIKE... 100"
570 PRINT "LIKE WOW ... CAN YOU DIG IT?"
1370 PRINT "LIKE..FAR OUT MAN...YOU DUG IT!!"
1510 PRINT "LIKE MAN...YOU WANT TO DIG IT AGAIN ?"
```

20. Run the program. Correct any syntax errors.

21. If your program runs fine let's save it on the diskette. Type SAVE followed by your last name and then hit return. Type CATALOG to make sure your program got saved on the disk. Now to make sure it doesn't get accidentally deleted. Type LOCK followed by your last name. Catalog again. Does your program have an asterisk in the left hand column. If yes, then it's locked.

22. For the next lab partner. Type NEW and continue from instruction #8.

++ Your laboratory points will be based on:

1) Questions asked on this lab sheet.
2) The program listing with answers on it.
3) The saved version of your new program on the diskette.

Clinical Microcomputer Applications
Rushakoff
Laboratory #8
Maintaining Client Files

Name:

Partners Name:

1. Use Clinical Microcomputer Applications Diskette #1.Put in drive and turn power on. Type catalog to see what programs are on this diskette. Press the space bar to see the rest of them. After you pressed the space bar you should have a bracket on the bottom of the screen with the flashing cursor.

2. Run FILE CABINET

3. You now see a Menu Page. It lists all the data bases on this diskette. It also allows you to create a new data base and delete unwanted ones. Choose Client Files by pressing #1. The disk drive will go on as it loads the file information into the computer.

4. You should now see the main menu page of File Cabinet.

?5. How many records are in this data base so far?

?6. How many more records can be put in?

7. You will be doing two exercises for this lab. You will enter a fictitious client file into the data base and search/sort for certain types of information.

8. For Part I choose #9 to look at all the client records. Take a look at record #1.

?9. How many fields are there in this data base?

10. Look at how the information is entered. For example the name is entered last name followed by a blank space (not a comma) and then the first name. All dates are entered with year first followed by month and day. Most of the information requires a yes or no response.

11. Press the return key to look through all the client records.

12. Let's practice some sorting now. Let's imagine you needed a print-out of all the client records in alphabetical order. Choose #6 for sorting. It will ask what field you want to sort by. Choose Name (#1). It will then ask if you want to sort alphabetically or numerically. Choose alphabetically.

It will tell you that it is sorting. It will then ask if you want to save this sorted version to the disk. Respond N. (If it does not give you this question then the sort did not occur. Choose #6 again and sort by name again. If you still did not get the 'save' question repeat the process.)

13. The records in the computer are now in alphabetical order by name. Choose #9 to look through all the records. They should appear to you in alphabetical order.

14. This process could take too long if you just wanted to get one persons record and there were hundreds of records in the data base. So let's search for just one persons record. On the main menu page choose #2...search. It will ask what field you want to search. Choose #1 (Name). It will then ask for the name. Enter Thomas. It should now show you Randy Thomas' record.

15. Now we are going to find out how many of the clients have a fluency problem. On the main menu page choose #6 to sort. Choose Have normal Fluency? as your field to sort by. It should tell you its sorting and then ask if you want to save the sort. Respond N. If it does not ask you this question, repeat the sort process.

?16 To find out how many of the clients have a fluency problem, press #9 to list all records. You should now be seeing Client Record #1. To make this a bit easier, put your finger on the monitor at the end of field #10 (fluency). That's were the information will be. Since the data base has been sorted the files that have no information on fluency will appear first.

So record #1 may have no information on fluency. Press return to see the next record. When you see the first NO appear on fluency start counting. (Remember the data base question was, "Have normal fluency?" so NO means does not have normal fluency.) When you see the first YES appear in fluency stop counting. How many clients had a fluency problem?

17. For Part II of this laboratory each person will enter a fictitious client record into the data base.

18. Choose #3, enter data. The program will prompt you for information. Enter fictitious data, except for Name. Use your name for this record. Put last name first, a space then first name and the press return. For dates, put year/month/day...77/7/21 . For complaints, put anything. For evaluation questions put only yes or no. If you have no information on a particular field, just press return to go on. When done the program will ask if there is any more information. Let the other lab partner put in a fictitious record. (Remember, use your own name for the record. At the end it will ask if there is any more information, Respond N. You will then hear the computer load all the data back onto the disk drive.

19. If you wish you may work some more with this program. When done press 10 to quit.

?20. How will maintaining client files on the microcomputer help the clinician? Use some specific examples.

Clinical Microcomputer Applications
Rushakoff
Laboratory #9
Maintaining Client Therapy Data

Name:
Partners Name:

1. Use Clinical Microcomputer Applications Diskette #1.
2. Run Therapy Data Collector

3. When the program finishes loading you will see the menu page. It gives you a choice of 9 things to do. For this lab you will 1) review some of the data files already entered and secure information from that file and 2) you will create a new client therapy data file and enter fictitious therapy data.

? 4. We first want some information from David Smiths's data collection. Choose #6 to see a client file. It asks you if you know his file number. If you do, enter that number, if you don't respond N. What does the program show you if you responded NO?

5. Now that you know his file number, choose #6 again and this time enter the file number. It will then ask if you want this file printed out. Respond N.

? 6. You will soon see the first section of the client file.

What is his primary disorder?

When did he start therapy?

7. You will notice that the file stopped listing after it showed you the first section of the file. To see the goals and data, press any key. To stop the listing press CTRL and S. It will stop listing in a moment. To continue the listing press any key. To stop it again, press CTRL/S.

? 8. How many goals does he have?

? 9. Look at Melinda Carlson's file. What's her primary disorder?
How many goals does she have?

10. You will now enter goals and data for a fictitious therapy data file. Choose #1 to create a new file. Enter information requested. Use your own name as Clinician. You can leave any section blank by just pressing return.

11. For your client, you will enter three goals and three pieces data updates for each of the three goals. Each goal may only be up to 40 characters long, so abbreviate your goals.

12. To see the file you have created, choose #6. When it asks if you wish to use the printer, respond Y. Get a printout of your file.

13. When you have finished that, choose #7 to see an alphabetically sorted list of all the client files on the diskette.

? 14. How will maintaining client therapy data on the microcomputer help you as a clinician?

15. Your lab points will be based on:

1) The file you created on the disk,
2) The printed out version of your file,
3) Questions on this lab sheet.

Clinical Microcomputer Applications
Laboratory #11
Microcomputer Assessment

Name:
Partners Name:

For this lab you will be using Clinical Microcomputer Applications disks #2 and #3.

1. Put disk #2 in disk drive #1. Put disk #3 in disk drive #2. Turn on the power.

2. For this lab you will be looking at three versions of a microcomputer receptive language assessment test.

3. Catalog the disk. Run CARROW TEST I. This version presents the verbal stimulus for each plate in synthesized speech.

4. Run CARROW TEST II. This version presents the verbal stimulus in digitized speech.

? 5. What's the difference between synthesized speech and digitized speech. Use your handout on the subject and your ears. Be specific.

6. Find the light pen. It is connected to the small cream colored box behind the microcomputer. Run CARROW TEST III. Enter the information requested. Use your own name for client. When the plates are presented you will see a large white box below each plate. That is where you touch the screen to indicate your response. Go through all eight plates. You now get a score menu. First look at the information on the screen. Then hit the space bar and print out your copy of the results.

? 7. How will microcomputer assessments benefit the clinician?

Clinical Microcomputer Applications
Rushakoff
Microcomputer Therapy
Lab #12

Name:
Partners Name:

1. Catalog Clinical Microcomputer Applications Diskette #1. You will be working with three programs: 1) The Oscilloscope, 2) The S Meter, and 3) Sentence Structure.

2. Run OSCILLOSCOPE. This program uses the Speechlink speech analyzer for the Apple. It gives the microcomputer 'ears.' Try producing a number of different consonants and vowels into the microphone. Try /t^/ and /d^/ several times to see if you can see a difference. Try several vowels.

3. To end OSCILLOSCOPE, just press an key and say, "OVER."

4. Run THE S METER. Once the client is able to produce the /s/ sound in isolation in therapy, The /s/ Meter will allow him to practice and maintain that production. This program does not teach the /s/ phoneme, but provides visual and auditory feedback on each production.

5. Follow the directions. When you get a blank screen with some print on the bottom of the screen you may start using the microphone. You may produce /s/ in isolation and in the initial position in words. Vary your productions. Say 'think'. Where does the green line go when you say 'think' ? Now say 'shink', where did the green line go. 'Sharpen' your /s/ sound in 'shink' and say it again. Now say 'sink.' Try a series of /s/ sounds in words. Vary your distortion of the /s/ sound and watch the green line and the feedback on the bottom of the screen. To see how well done, press any key and say, "Data." Press Y if you would like to try it again.

6. How will microcomputer therapy help the clinician and the client?

Clinical Microcomputer Applications
Rushakoff
Microcomputer Assisted Therapy
Lab #13

Name:

Partners Name:

1. Use Clinical Microcomputer Applications Diskette #1. Run Sentence Structure. Read directions. Each person must create 3 syntactically correct sentences and three syntactically incorrect or incomplete sentences.

2. Write the sentences you will use below and indicate what happened.

#1.

Result:

#2.

Result:

#3.

Result:

#4.

Result:

#5.

Result:

#6.

Result:

3. Does this program use graphics?

4. Does it use sound effects?

5. Does it maintain data for the clinician or teacher?

6. Inappropriate use of tense markers on regular verbs may be a common syntactic deficit. On the back of this lab sheet, in 50 -100 words describe in narrative form a quality microcomputer program that would teach regular verb tense markers to 7-9 year olds in the public schools. (Hint: Think about how it's done in therapy.)

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BIOGRAPHICAL SKETCH

Gary E. Rushakoff was born on July 14, 1952, in Chicago, Illinois. He graduated from Niles East Township High School (Skokie, Illinois) in June of 1970. Following high school, Mr. Rushakoff earned a Bachelor of Sciences degree in speech and hearing sciences at Bradley University in June of 1974 and a Master of Arts degree in speech pathology at The University of Illinois in August of 1975.

After receiving a graduate degree Mr. Rushakoff was employed as a speech-language pathologist for two years at the Southside Virginia Training Center in Petersburg, Virginia. He entered the doctoral program at the University of Florida in September of 1977. In January of 1981 Mr. Rushakoff developed the Clinical Microcomputer Laboratory at the University of Florida Speech and Hearing Clinic. He is the senior author of several administrative and clinical microcomputer programs. He has presented numerous workshops and short courses around the country on the clinical applications of microcomputers and on the utilization of the microcomputer by non-vocal, severely physically handicapped individuals.

In September of 1982 Mr. Rushakoff will be employed as an assistant professor at New Mexico State University in Las Cruces.

I certify that I have read this study and that in my opinion it conforms to acceptable standards of scholarly presentation and is fully adequate, in scope and quality, as a dissertation for the degree of Doctor of Philosophy.

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This dissertation was submitted to the Graduate Faculty of the Department of Speech in the College of Liberal Arts and Sciences and to the Graduate Council, and was accepted as partial fulfillment of the requirements for the degree of Doctor of Philosophy.

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